A HITCHCOCK PUBLICATION

Grinding and Finishing

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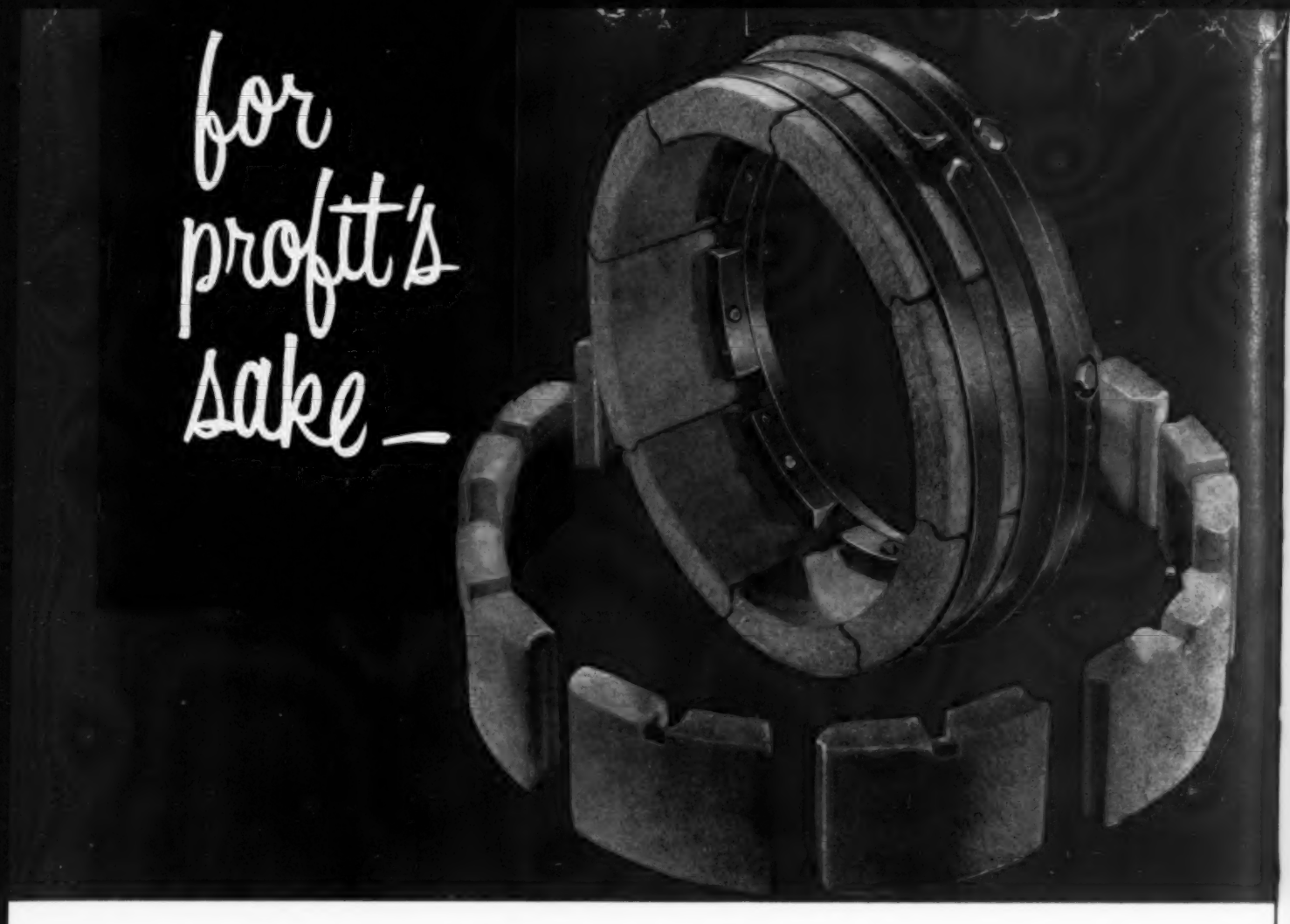
MAY 16 1961
TECHNOLOGY
DEPARTMENT

WHEEL EVALUATION TEAM
boosts production, quality, reduces costs

also in this issue: Portable Wheel Testing—A New Approach

Standard Wheel Markings—Structure

Diamond Wheels—Which Concentration?

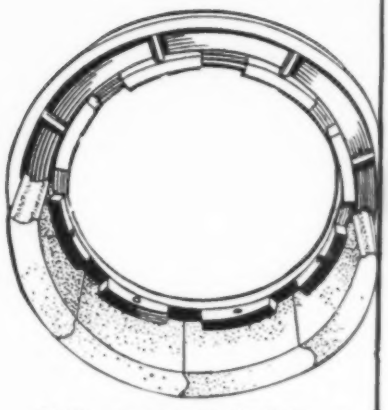


Use Sterling's No. 2 Chuck and Segments on every Surfacing Job!

Sterling Chucks are light-weight, not complicated, readily handled, quickly installed. They are easy on bearings. This reduction of weight makes for unusual efficiency—more power is used for grinding rather than operating the chuck. The Sterling No. 2 Chuck is safe—always. Its individual mountings provide a positive segment grip easily regulated by a simple twist of a socket wrench. Adaptable to all surface grinders, Sterling No. 2 Chucks are supplied to take segment rings from 8" to 42" in diameter. There's one for your machine!

Sterling's interlocking segment design means added strength throughout the entire abrasive ring, presents no dangerous projections to catch on materials being ground. The minute air spaces between segments mean cooler grinding, wider spread of coolant, better finish without chatter marks. Identical in design, Sterling Segments always fit your chuck, firmly and rigidly.

A Sterling engineer, skilled in solving hundreds of similar jobs, will gladly work with you and recommend the segments needed to speed up your surface grinding jobs. Write or wire us today.



Here is shown Sterling's famous chuck and segment assembly. Note the eight segment-holding units and the interlocking segment design. Easily removed, readily replaced, these superior segments in Sterling's No. 2 Chuck are a winning combination every time!

STERLING GRINDING WHEEL CO.

TIFFIN, OHIO

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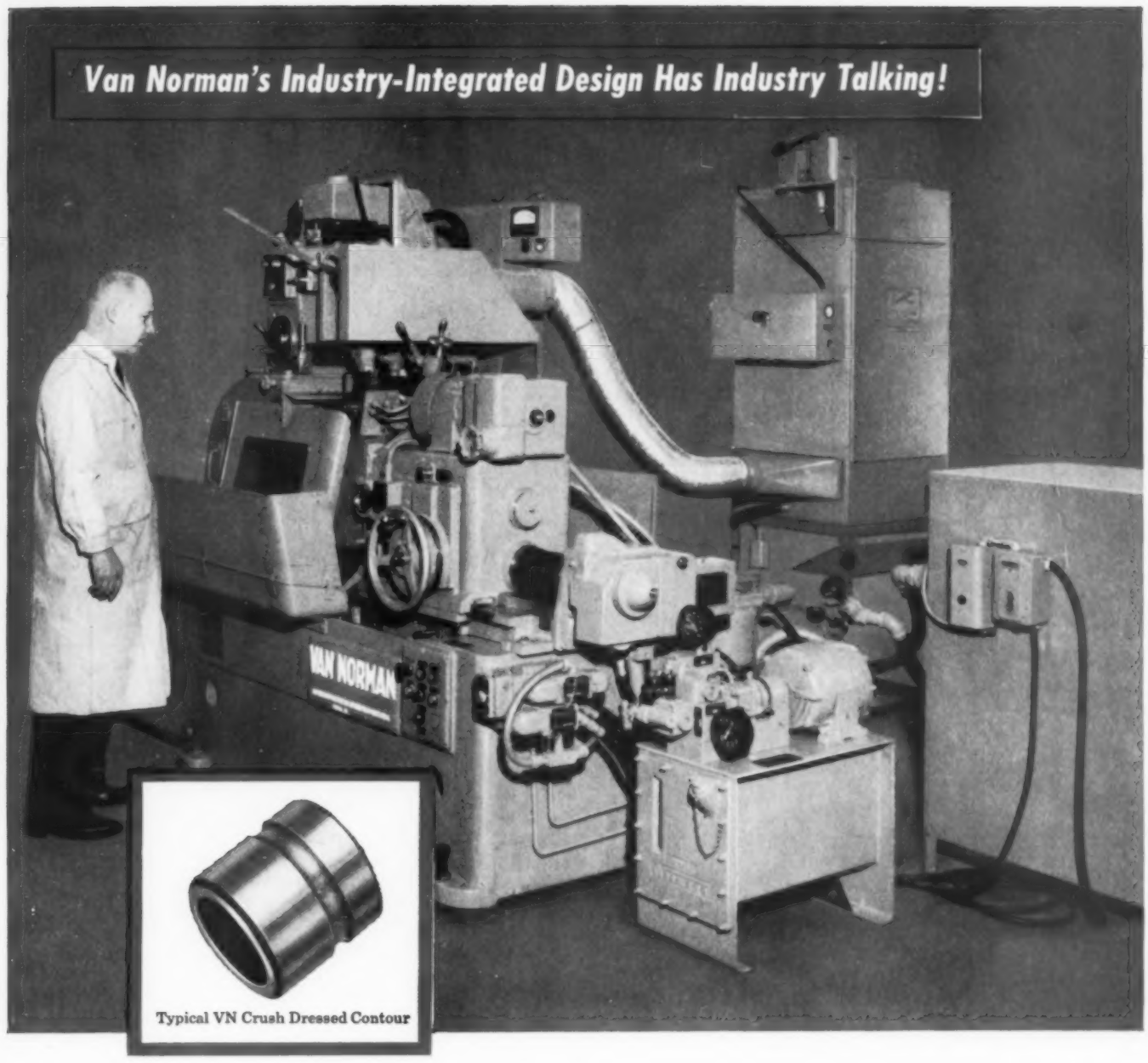

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VN Centerless Grinders volume-produce or handle limited runs with equal versatility . . . economy

A Van Norman Centerless Grinder, with crush dress equipment, will grind intricate shapes and volume-produce many parts previously thought impossible.

Faster Output To Close Tolerances—typical of the high-speed, close-tolerance operations performed by Van Norman is the crush formed part shown. A crush formed wheel grinds the O.D. and ball race simultaneously, holding .005 radius on the corner of the ball race, .001 tolerance on race curvature and .0005 on the O.D. and diameter of the ball race, with 10-12 RMS finish. This part is ground in one operation, after a Thru-Feed grind on O.D. In the finish grind operation the O.D. and ball race are ground simultaneously to insure concentricity. Stock removal .004; Infeed cycle 12 seconds. Result: five parts are finished per minute, 300 per hour.

Free Booklet—**"Centerless Grinding"**—valuable guide to high production, lower costs. For your copy, contact factory or your local distributor. 4134

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CINCINNATI

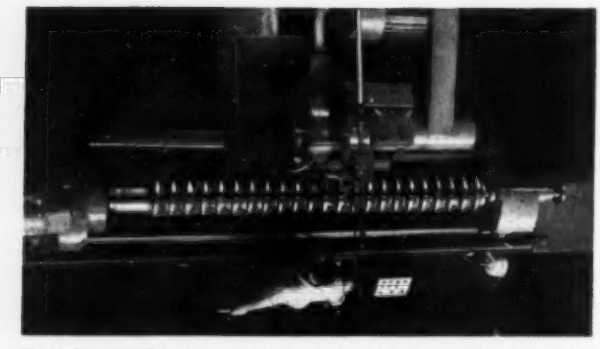
FILMATIC PLAIN GRINDER saves up to 35 hours

in grinding hard-surfaced mixing screw

AT THE RIGHT you see a rough, tough part. It's rough because it has been hard-surfaced by welding. It's tough because, until recently, it taxed the ingenuity of manufacturing engineers to machine it.

The part is a 16″ diameter mixing screw, manufactured by a prominent builder of food and chemical machinery. The problem was to machine the OD of the flights to a smooth finish and at a reasonable cost. Formerly the part was turned on a lathe, requiring 35 to 45 hours. Too expensive. Now, the OD is *ground* in 10 to 15 hours! A CINCINNATI FILMATIC 24″x 120″ Plain Grinding Machine performs the operation, reducing cost by more than half. And, finish is of a much higher quality than ever before.

All CINCINNATI Centertype Grinding Machines are built to remove metal rapidly and to the highest standards of quality. Generously proportioned structural elements are one plus factor. Another is the dependable pressure lubricating system for the ways. And still another is the FILMATIC bearing mounting for the grinding wheel spindle . . . no adjustment ever required for extreme variables in stock removal. More information on CINCINNATI FILMATIC Plain and Roll Grinding Machines in the heavy duty sizes may be obtained by writing for Catalog G-709-1.



Tops in grinding heavy, hard stock and large work. It's easy for this new CINCINNATI FILMATIC 24″ x 120″ Plain Grinder. Catalog G-709-1.

BUILDERS OF PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CEN

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHI

Photographs courtesy of Baker Perkins, Inc., Saginaw, Mich.

Huge savings in time are gained by replacing turning with grinding to remove hard, heavy stock on the OD of mixing screws. A CINCINNATI 24" x 120" Plain Grinder performs the operation, grinding the rough, interrupted surfaces to a high-quality finish.

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GRINDING MACHINE DIVISION

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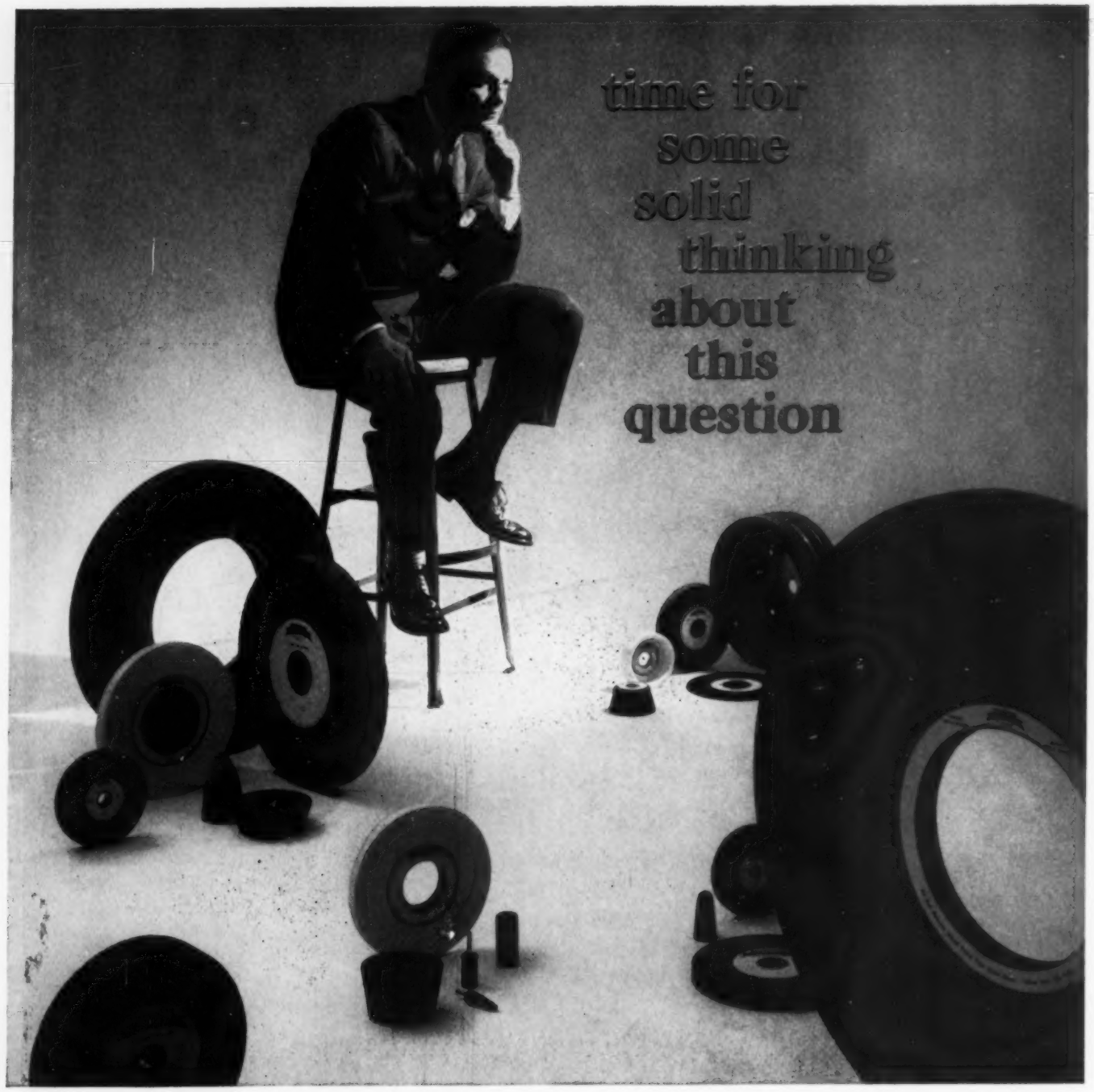

Are *you* getting the most profitable ratio between grinding costs and production? The key is efficient grinding wheel performance . . . and with Simonds Wheels you get it. Complete line has grinding wheels of every grain and grade combination . . . expertly-engineered products, thoroughly tested, readily available . . . and, in specifications now proving their cost-saving efficiency. New illustrated catalog provides complete information. Write for copy on your letterhead.

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Grinding and Finishing

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Test
23 ALUNDUM* abrasive
for premium performance at non-premium price . . . on your production!

The newest Norton development for production grinding is for production economy, too.

It's 23 ALUNDUM abrasive.

This is no ordinary aluminum oxide. Except for price — which is *non*-premium — 23 ALUNDUM abrasive is *premium* in every respect. It has premium toughness . . . premium sharpness . . . and free, fast, cool cutting action that means premium precision performance.

Other big advantages are friability, which minimizes dressing . . . precise duplication, which assures uniform performance . . . and versatility that includes grinding of all steels, boiler plate, cast iron, Meehanite, aluminum and many other widely varying metals.

All of which adds up to the proved premium value of 23 ALUNDUM abrasive — in the broadest range of production grinding. For example:

Surface Grinding. With the new 23 ALUNDUM segments and cylinders, users are getting freer cutting and higher production rate on large die blocks, high vanadium steel tool bits, attrition plates, high carbon steel knives, stamped metal parts and similar work.

Centerless Grinding. Excellent results on bar stock grinding for automotive parts of carbon and stainless steels, cast iron and other metals, hard and soft.

Cylindrical Grinding. Top quality, low cost volume production of high speed steel drills, reamers and taps, laminated armatures, cams, shafts, sleeves and valve stems.

Internal Grinding. Bearing races and bores, precision ground faster to tight limits and fine finish, with less wheel dressing. Reduced grinding costs on cylinder bushings, die holes, rocker arms and wrist pins.

That's just a brief outline of 23 ALUNDUM abrasive's advantages for production grinding.

You can *see* them in action, right in your own plant — you can watch 23 ALUNDUM wheels or segments adding new speed, accuracy and economy to your own production grinding.

Your Norton Distributor or your Norton Man will be glad to arrange a test run in your plant, with expert aid in wheel selection. See him soon. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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EQUIPMENT AND MATERIALS

In the February 1961 issue, page 50, there is a statement we would like to have clarified.

In the next-to-the-last paragraph it reads: ". . . Coolant was Cincinnati Milling 1500 water soluble oil."

We make a water soluble coolant, W & B Grinding Concentrate 1500. We are inclined to think that possibly it was our product that was used. . . .

The White & Bagley Company
Mary T. Holland
Advertising Manager

Editor's Note: The original reference, as printed, has been checked out with the Wyman-Gordon die shop in Worcester, Mass., the original installation, as reported by Norton Company.

In response to a query, Roger Perry of Norton's Public Relations Department replied:

"When we took the photograph we asked the supervisor what coolant was being used. We reported it as it was given to us. . . .

"Today, on checking back at Wyman-Gordon, I learned that the coolant they were, and are, using is White & Bagley Grinding Concentrate 1500."

This should set the record straight. So, our apologies to White & Bagley . . . and to any Cincinnati people who may have been puzzling out what was actually being employed.

STATE SAFETY CODES . . .
Connecticut

For the sake of the record, I would like to give you some background data on code-making authority in Connecticut.

Until 1959, there was no statutory authority for the promulgation of safety codes, regulations or standards except for boilers and elevators. Legislation passed by the 1959 session of the General Assembly, however, gave such authority to the Labor Commissioner, and made provision for an Industrial Safety Committee to advise the Commissioner.

It is on the basis of this authority that the department is now proceeding to establish these standards in accordance with statutory procedure.

In making its first recommendations to Commissioner Ricciuti, the Committee advocated the establishment of four codes of the American Standards Association which might be considered basic to Connecticut industry . . . the ASA Code for Abrasive Wheels was included.

Commissioner Ricciuti called for public hearings, as required by law and which you mentioned in your article. The Commissioner is now evaluating the testimony presented at the hearings and in conjunction therewith, inspections are being made of those individual firms which expressed fear that their present safety devices would be in conflict with the codes. After this appraisal, the Commissioner will render a formal decision.

I think you will agree that Connecticut should be counted among those states with code-making authority and further, that we are now proceeding toward the establishment of nationally recognized safety codes in accordance with our statutory procedure.

Very truly yours,
Leo J. Dunn
Deputy Labor Commissioner

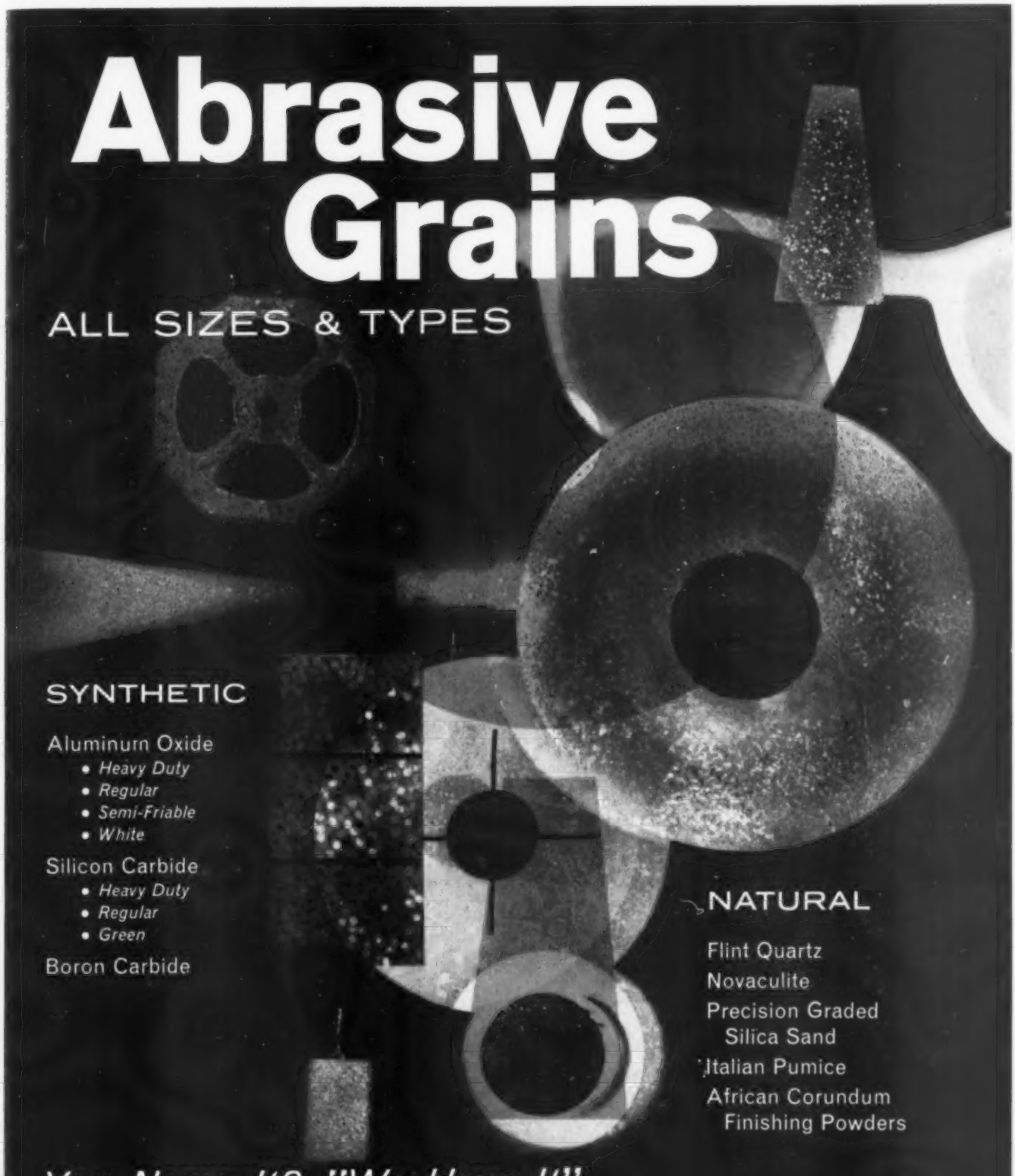
Editor's Note: We are glad to recognize Connecticut's progress and to commend them most heartily on their procedure.

The fairest and most practical procedure, it seems to us, is to do as Connecticut and a number of other legislatures have done in this situation: to give codes of the American Standards Association or organizations of equivalent national standing, technical competence, and objectivity the force and effect of law.

This at one stroke does away with the pitfalls and difficulties of drafting an individual set of regulations, and provides for automatic updating of the code when new developments come along.

Abrasive Grains

ALL SIZES & TYPES



SYNTHETIC

Aluminum Oxide
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- *Regular*
- *Semi-Friable*
- *White*

Silicon Carbide
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- *Regular*
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Unique new use of specia

In manufacturing, fragility and heavy maintenance costs are intolerable. That's why General Electric's F. W. Rueblinger investigated the replacement of milling cutters with diamond abrasive wheels in his arc-quencher finishing operation. As Manager of Manufacturing of G-E's Medium Voltage Switchgear Department, Philadelphia, he was dissatisfied with having to maintain a large inventory of cutters and to keep men working around the clock sharpening and replacing them.

Arc-quenchers are made of a hard and extremely abrasive asbestos compound. This presented such a problem that all but one of the abrasive people consulted threw in the sponge. The one who didn't was Bay State distributor Vince Flynn. He arranged for key General Electric production men to meet with Bay State's Research Staff in Westboro and the problem was examined from every possible angle.

Finally, after extensive development work, Bay State engineered a special 12" diamond wheel that cut fast and maintained the extremely fine tolerances necessary in the finishing of these important parts of Metal-clad Switchgear.

With as many as 136 wheels on a single arbor simultaneously making ¼" deep cuts, the problem of driving power alone could have been disastrously troublesome. However, the wheels Bay State developed cut so easily that it was possible to increase the feed rate nearly 400% . . . and overall productivity went up a good 50%.

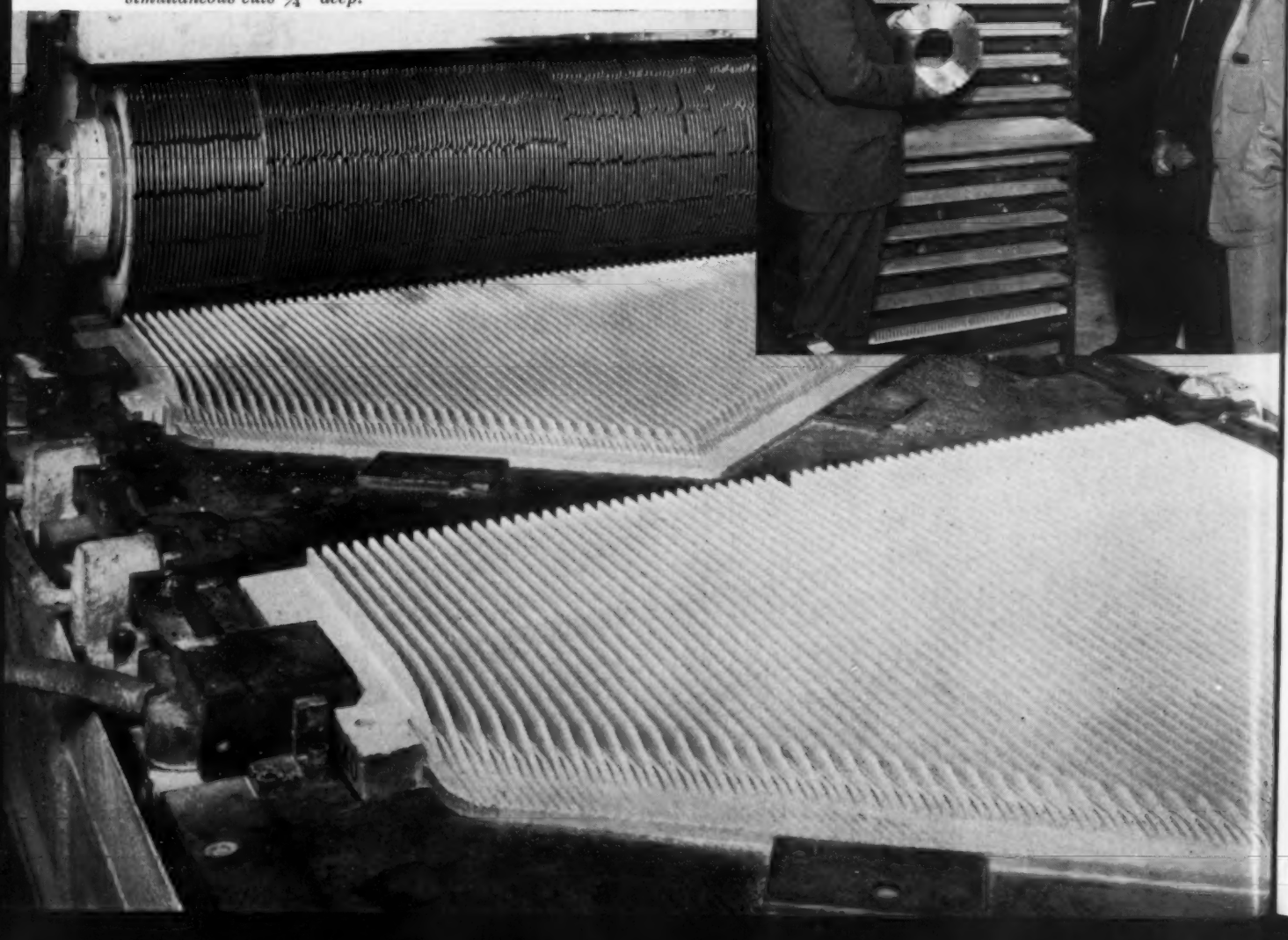
On top of these already proven advantages, wheel life is estimated at three full years so the constant down-time problems that used to arise from the need for cutter maintenance is entirely a thing of the past.

This outstanding success is not the end of the story. Now that General Electric's man-made diamonds are available for metal-bonded wheel applications, Bay State is engaged in intensive research into the even greater application potentials of this material.

Whether you have an unusually complex problem, or are simply trying to pare down costs, you'll find your Bay State distributor or direct representative is both hard working and thoroughly experienced. *Better grinding at lower cost . . . that is his business.*

Right: Discussing the increased productivity that resulted from grinding, instead of cutting, hard asbestos-composition arc quenchers, are, left to right, Vincent J. Flynn, Bay State Distributor, F. W. Rueblinger, Manager-Manufacturing, John Stabb, Supervisor-Advanced Manufacturing-Engineering, and William A. Siler, Manager-Manufacturing-Engineering.

Below: Two arc-quenchers are shown immediately after passing under a tremendous array of 136 Bay State diamond wheels which have made simultaneous cuts ¼" deep.



diamond wheels ups productivity 50%

Vincent J. Flynn was a Tool & Die Maker at the Frankford Arsenal when World War II came along and he joined the U.S.A.F. With this solid background in practical shopwork, he went into industrial distribution after the war, opening up his own business 5 years ago. Now a highly successful Bay State Distributor, he has this to say about Bay State: "They not only give me and my customers first-class service on routine problems . . . they also roll up their sleeves and dig in every time I come up with a puzzler . . . like this one, for example."

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

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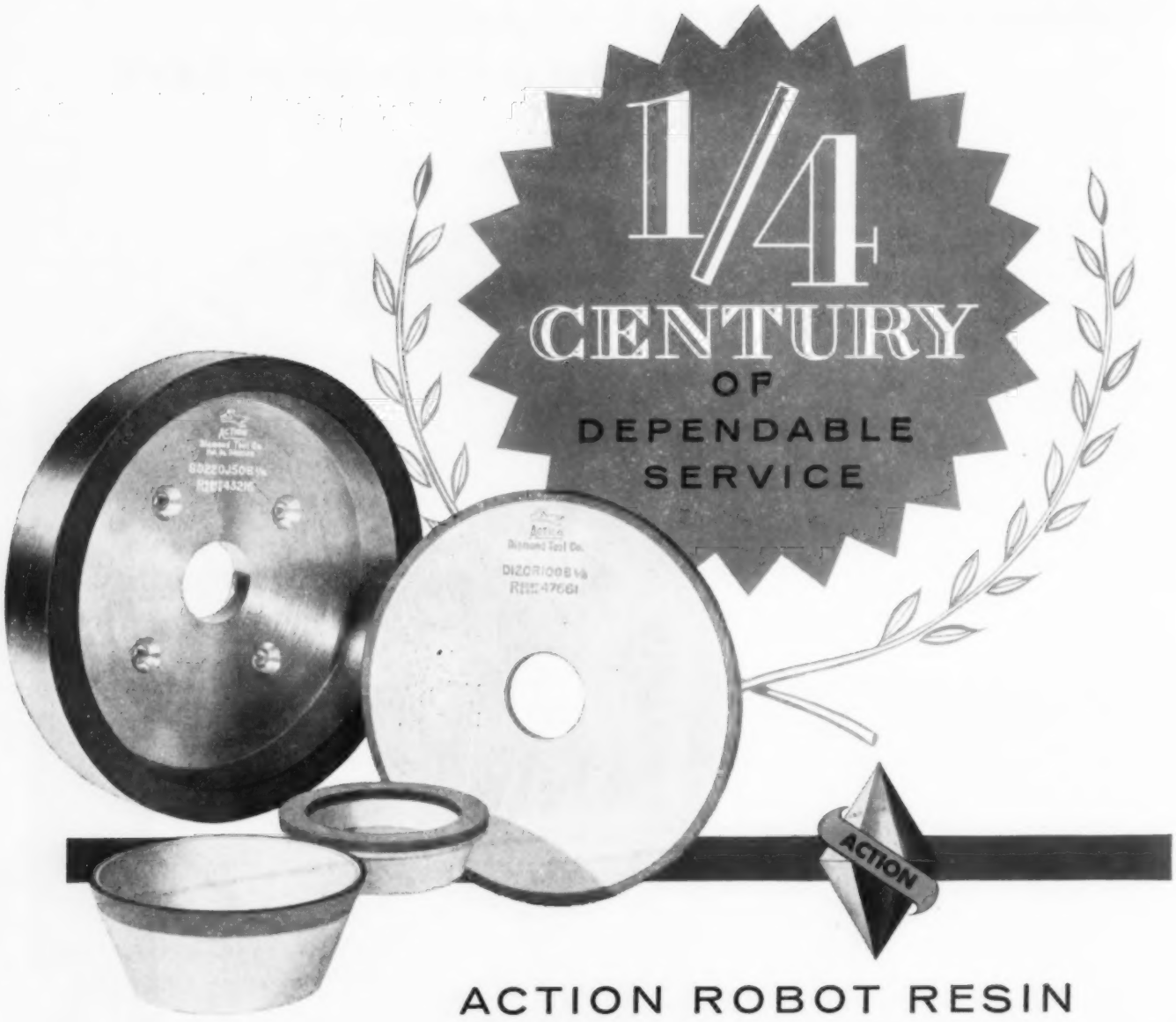

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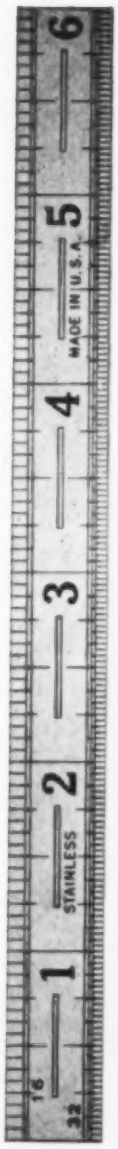
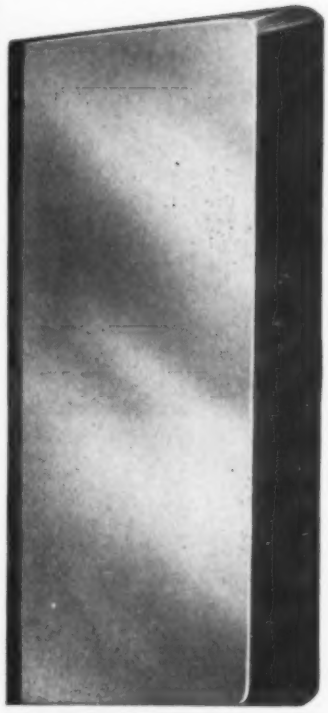
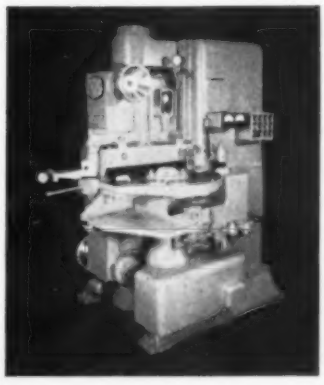




Tungsten carbide rock drill insert ground on Besly DV 2 Grinder. Courtesy Adamas Carbide Corporation, Kenilworth, New Jersey.

GRINDS FIFTY 3½" CARBIDE BITS PER HOUR



BESLY DV 2
DOUBLE VERTICAL GRINDERS

The Besly DV2 is designed for tough production grinding jobs and this job—tungsten carbide inserts for mining drills—is the toughest it's met yet. The DV2 took the job in stride, and kept well within tolerances of .004" for size, .005" for flatness and .002" for parallelism.

The DV2 using resinoid-bond abrasive discs—also grinds parts ranging from .050" to 2½" in thickness and .375" to 3" in diameter including ceramics, stampings, plastic parts, alnico magnets, bearing races, coil springs, and carbon parts.

Write for this new illustrated catalog of Besly Production Disc Grinders.

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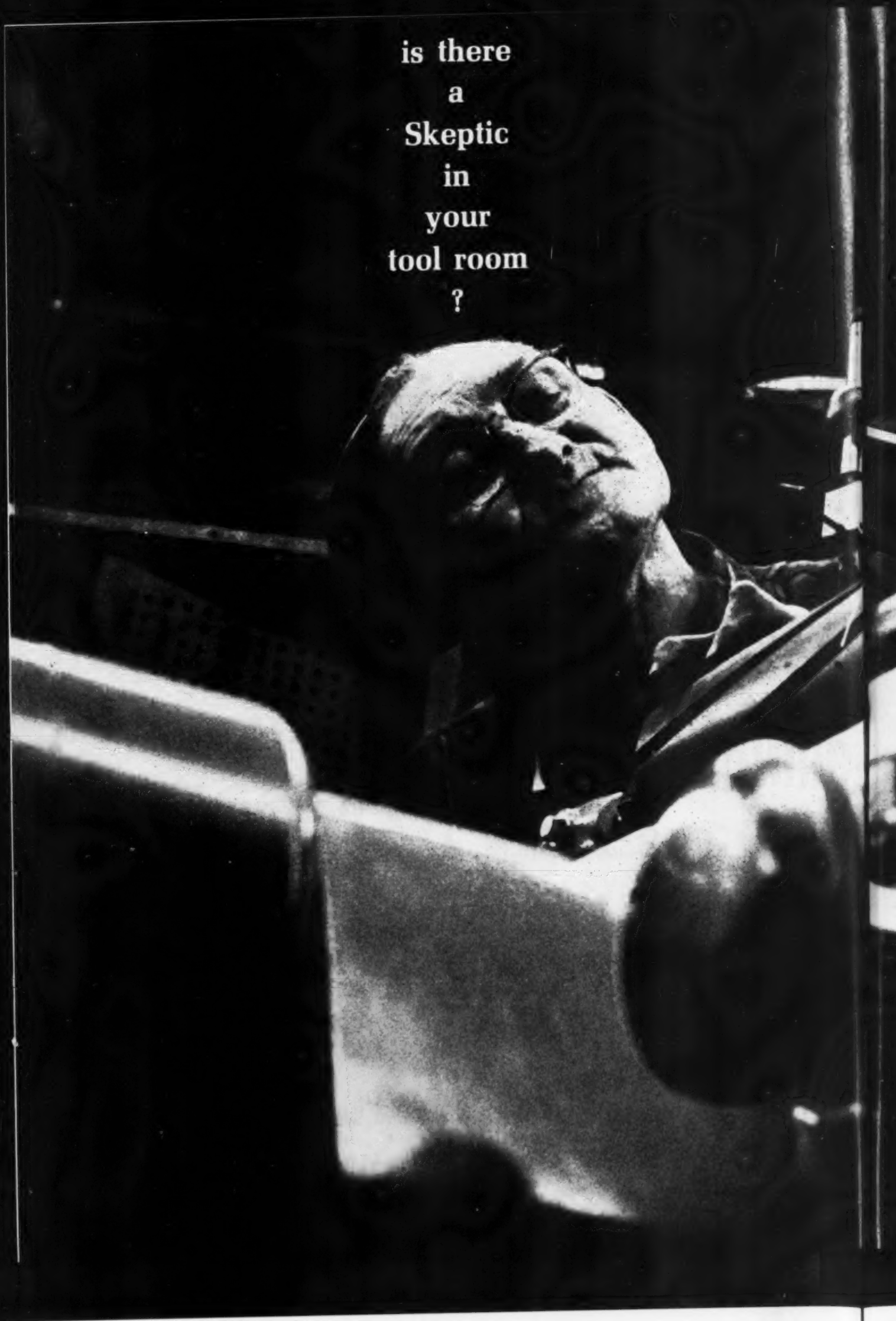
is there
a
Skeptic
in
your
tool room
?

There is a totally new grinding wheel so genuinely good that you'll want no one but your tool room skeptic—the man *least* likely to be impressed—to make the test.

Set up on one of the super-hard tool steels, or on a rugged circular-form grinding job. Together you will experience the rare pleasure of discovering something entirely new and honestly superior: a wheel with the staying power to grind farther and faster than any other you have known.

The wheel to specify is Carborundum's PA-V40 (the initials PA stand for a totally new abrasive grain). To arrange an immediate test, simply call your Carborundum distributor or factory representative.

CARBORUNDUM

SAM SAFETY SAYS

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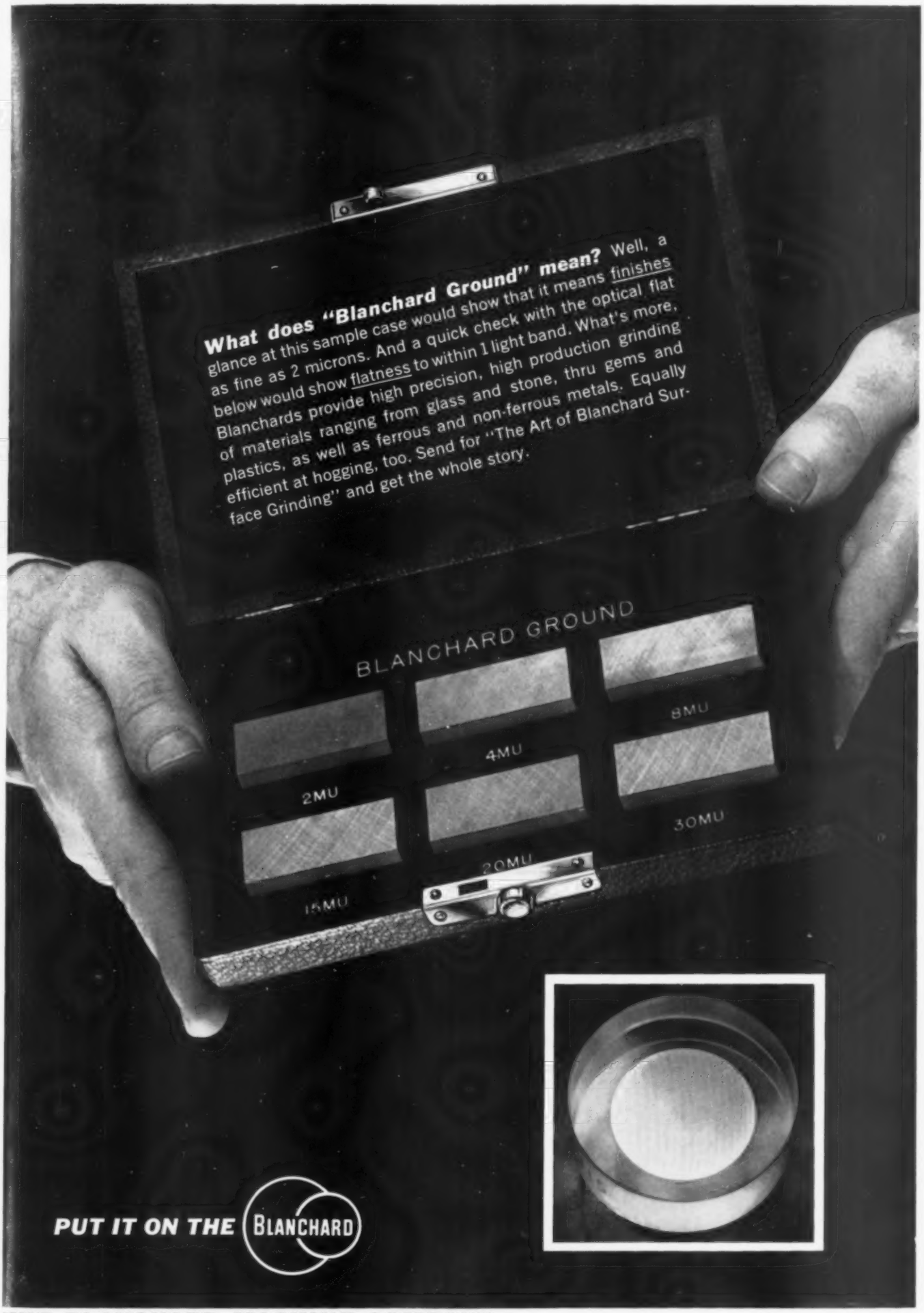
What does "Blanchard Ground" mean? Well, a glance at this sample case would show that it means finishes as fine as 2 microns. And a quick check with the optical flat below would show flatness to within 1 light band. What's more, Blanchards provide high precision, high production grinding of materials ranging from glass and stone, thru gems and plastics, as well as ferrous and non-ferrous metals. Equally efficient at hogging, too. Send for "The Art of Blanchard Surface Grinding" and get the whole story.
BLANCHARD GROUND
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4MU
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20MU
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THE BLANCHARD MACHINE COMPANY 64 State Street, Cambridge 39, Massachusetts

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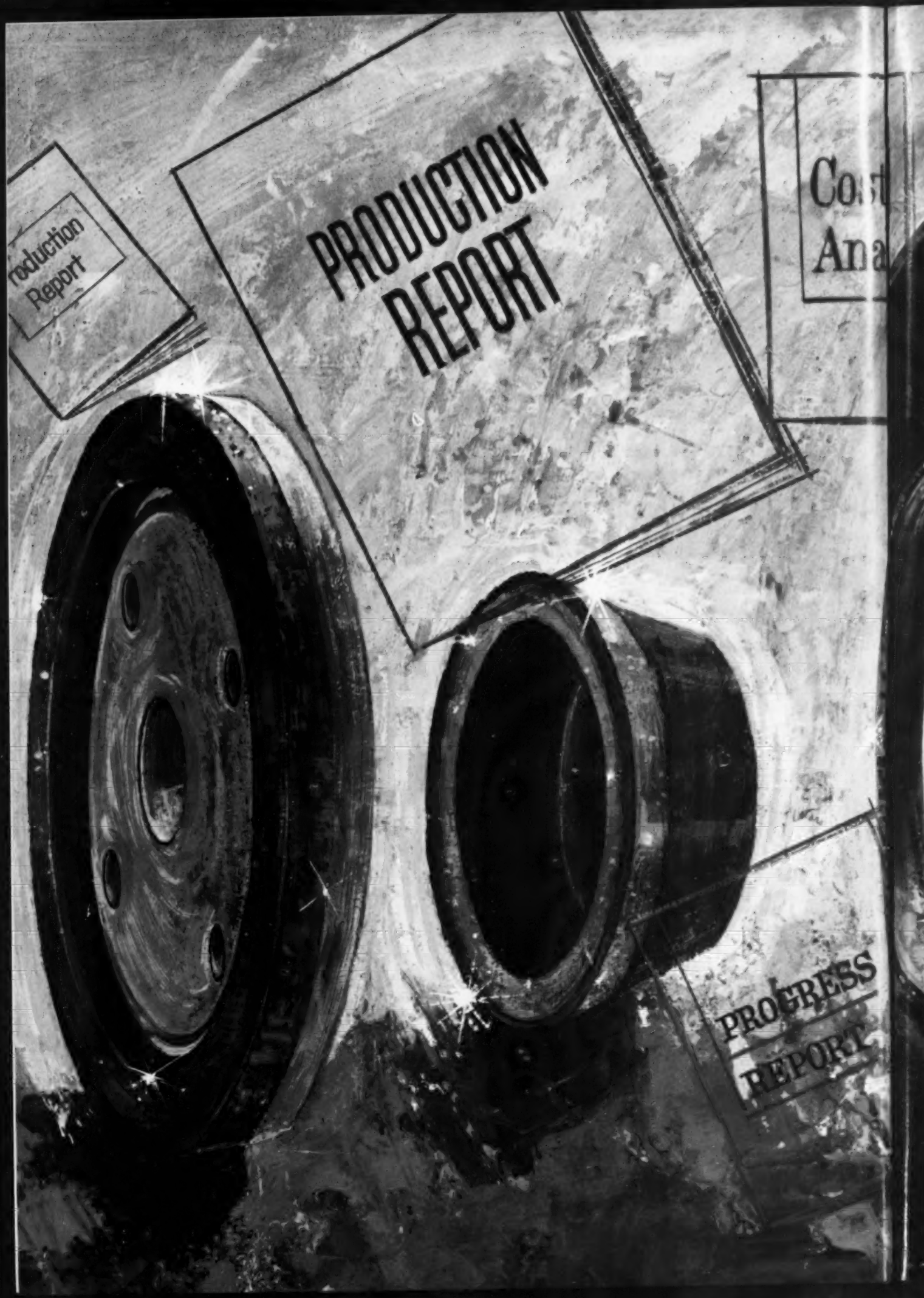
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G-E Man-Made Diamond's contribution to industry

In the few brief years since its introduction, General Electric Man-Made diamond has made important contributions to industry. Specifically, grinding wheel users receive these benefits when they choose wheels containing G-E Man-Made diamond:

Superior grinding performance with General Electric Man-Made diamond over mined diamond has been borne out time and time again. This adds up to one thing: More output per wheel when it contains G-E Man-Made diamond. That's like money in the bank!

Special crystals for all three bonds let you meet your grinding requirements exactly. Resinoid, vitrified, or metal—General Electric makes diamond perfectly suited for these bond types.

Consistent performance is assured by the uniform shape and structure of General Electric Man-Made diamond crystals produced by controlled manufacturing processes.

More to come. Just as General Electric has continually improved the characteristics of Man-Made diamond since its introduction, the future promises bright new things in diamond development. The perfection of special crystals for saws, drill bits, tools, wear parts and specialized abrasives may be a few of the things you can expect during the coming years.

Want to obtain the maximum output per diamond grinding wheel? Then follow the ever-increasing number of wheel users who are specifying G-E Man-Made diamond in the wheels they are ordering from their suppliers.

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MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

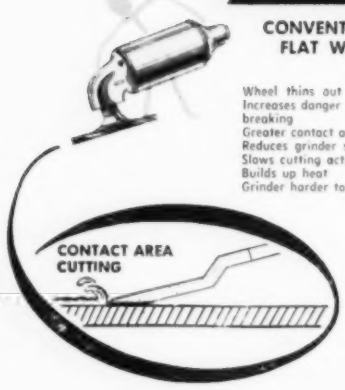
AmeriCool

A MIRACLE NEW . . . . . DISHED-DEPRESSED CENTER WHEEL by "American"

SPEED *(fast removal of metal)*

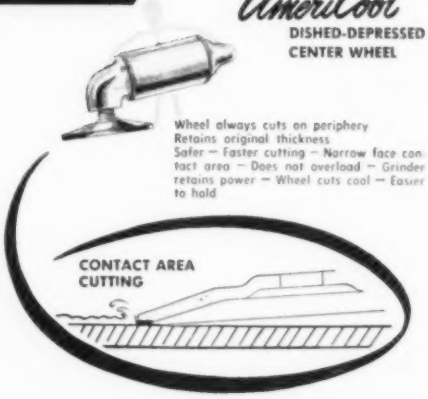
CONVENTIONAL FLAT WHEEL

Wheel thins out at edge
Increases danger of wheel breaking
Greater contact area
Reduces grinder speed
Slows cutting action
Builds up heat
Grinder harder to hold



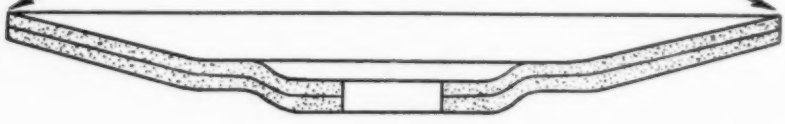
WITH NEW AmeriCool DISHED-DEPRESSED CENTER WHEEL

Wheel always cuts on periphery
Retains original thickness
Safer — Faster cutting — Narrow face contact area — Does not overload — Grinder retains power — Wheel cuts cool — Easier to hold



SAFETY

The New Safety Dish Shape permits the use of tough, flexible, "Armor Clad" glass cloth on the critical cutting side without sacrifice of grinding efficiency, giving nearly a 2:1 built-in safety ratio.

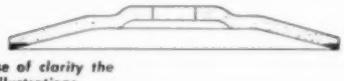


CONVENTIONAL FLAT WHEEL
CONTACT AREA SMOOTHING AND CLEANING

Generally considered an unsafe practice
Dangerously thins wheel
Kills power — slows operations

WITH NEW IMPROVED AmeriCool DISHED-DEPRESSED CENTER WHEEL
CONTACT AREA SMOOTHING AND CLEANING

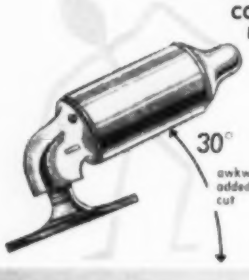
Safe operation — wheel thickness is maintained
Narrow contact area — cuts faster. Minimum power loss. Easier operation.



Always use a Guard . . . for purpose of clarity the Guard was not included in these illustrations.

COMFORT

with CONVENTIONAL FLAT WHEEL



awkward — tiring requires added pressure to make cut

WITH NEW AmeriCool DISHED-DEPRESSED CENTER WHEEL

Provides more comfortable performance — easy to use with little pressure required to get cutting action or hold grinder steady.

COMPARE THESE FEATURES

Ruggedly reinforced with three full layers of fiberglass permanently resin-bonded and molded to shape. "American's" new Dished-Depressed Center Wheels possess unusual strength and resistance to breakage having nearly a 2:1 safety plus ratio over conventional depressed center wheels. This improved safety factor is made possible by the third full layer of fiberglass fabric, reinforced molded throughout the important bottom side — the most critical area that must withstand the greatest stress while grinding. This unique feature alone will appeal to the safety conscious wheel buyer who demands fast cutting performance along with long wheel life economy.

CALL YOUR SUPPLIER OR WRITE

"American" EMERY WHEEL WORKS

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There is a KOEBEL DIAMOND TOOL to meet every exacting demand in the industry

Multi-Point, Multi-Set, and Single Point Wheel Dressing Tools.

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CDP Cutter for Perpetual Forming of Grooved Grinding Wheels.

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Dia-Pak Coring Bits for Exploratory and Concrete Drilling.

Shaped CDP Cutter for Grinding Hard-Fired Ceramics and Super Hard Alloys. CDP Precision Drills (from .020" Dia. up) for these materials are available in solid and coring types.

Round and Blade Type CDP Dressing Tools.

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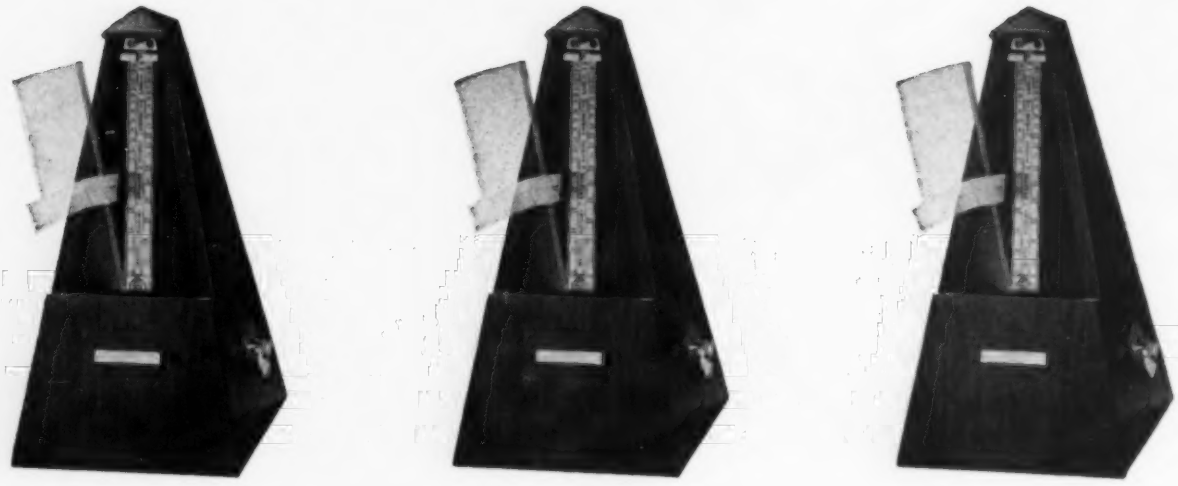

POSITIVE DUPLICATION—EVERY TIME!

With these three metronomes—or with a thousand—the time interval you choose can be positively duplicated time after time after time. And with these three Ⓟ° surface wheels—as with *all* CINCINNATI Ⓟ GRINDING WHEELS—you'll get the same kind of Positive Duplication *every time*!

HERE'S WHY . . . IN 36 STEPS

There are 36 unvarying quality control steps in Cincinnati's unique Ⓟ manufacturing process. Right from the start with the choice of the "grains" that go into a wheel, Ⓟ procedures involve exacting checks and re-checks. Every grain characteristic—from size, cleanliness, absence of foreign matter, color, magnetic content, to bulk density before and after blending—must fully satisfy extraordinary Ⓟ specifications, which are followed throughout in all 36 rigid controls.

RESULT: PREDICTABLE PERFORMANCE

You can depend on the uniformity of Ⓟ WHEELS—for each reorder wheel gives you exactly the same good job as the original. Production goes up and stays up. Costs go down and stay down. This is the promise—and performance—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of our Cincinnati-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI Ⓟ GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Ⓟ POSITIVE DUPLICATION

CINCINNATI®
GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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Dateline: Industry's Economy

Businessmen and organizations have been invited by the government to submit their ideas on trade negotiations with 12 countries. The negotiations, under the General Agreement on Tariffs and Trade, will concern import restrictions by other countries for balance-of-payment reasons.

The invitation for views was put out by the Committee for Reciprocity Information, an interagency group through which U.S. business can express its ideas on trade talks.

Receipts and expenditures of the Federal Government in the current fiscal year which ends on June 30 are expected to be at postwar record levels. According to early-year budget estimates, total federal income will exceed outlays by small margins.

For the next fiscal year, ending June 30, 1962, the federal budget assumes that federal tax on gasoline and aviation fuel will be increased; that personal income will rise from $404 billion in 1960 to $415 billion this year; that corporate pre-tax profits will increase from $45 billion to $46 billion; and that the total expenditure of the economy for goods and services in 1961 will exceed those of last year by some 2%.

Most businessmen are willing to give up capital gains treatment for depreciable property sales in return for a "more adequate depreciation system," according to a recent study made by the Research Institute of America.

Businessmen said investment decisions to increase capital expenditures would be spurred if the government would liberalize depreciation allowances. The depreciation system most of them would prefer is one giving each company freedom to set its own schedule of years for depreciating plant equipment and facilities, acknowledging, however, that such systems have to be on a constant basis and not changed at all.

American businessmen have told the government they plan to spend some $34.6 billion this year on expansion and modernization. That would mean a drop of 3% from the 1960 level of $35.7 billion.

Business plans to reduce capital spending through the first half of the year, but looks for moderate expansion in the last half. A report says that businessmen planned to spend at the rate of $34.4 billion in the first three months of 1961. Outlays would drop to a rate of $33.8 billion in the April-June quarter.

Manufacturers have indicated they look for a 3% rise in shipments this year. Exceptions were the auto and steel industries, which projected lower levels. Plant and equipment spending by manufacturers, on the basis of present plans, will be down 3% from 1960. Firms making durable goods expect to cut outlays some 7% with the sharpest reductions by iron and steel companies. The auto industry looks for a 15% increase in its capital spending.

Anticipated spending programs for major groups were: manufacturing, $14.1 billion; railroads, $600 million; utilities, $6.2 billion; and commercial, $10.8 billion.

Sales of manufacturing corporations increased by $7.7 billion last year to a record $345.7 billion, but profits dropped from $16.3 billion to $15.2 billion. The Securities and Exchange Commission and the Federal Trade Commission said that profits of durable goods manufacturers were down 13% to $7 billion, on a sales increase of 3%, to $173.9 billion.

Mexico is on the threshold of a big investment boom, according to the country's Secretary of Industry and Commerce. He said special interest had been shown by Mexican and foreign capitalists in the chemical, iron and steel, petrochemical, automotive, and machinery industries, with emphasis on industries manufacturing products usually imported.

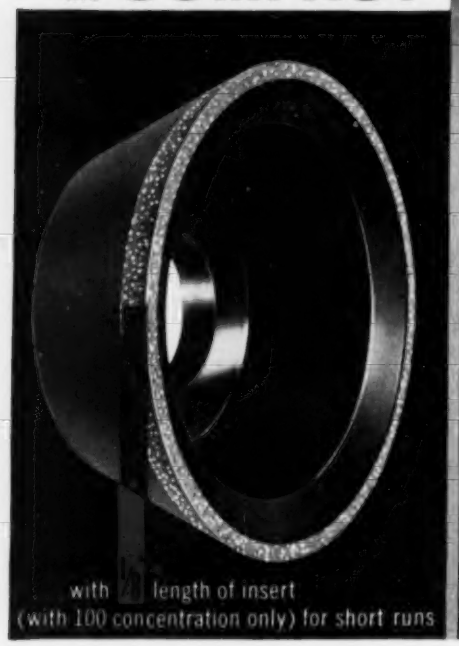
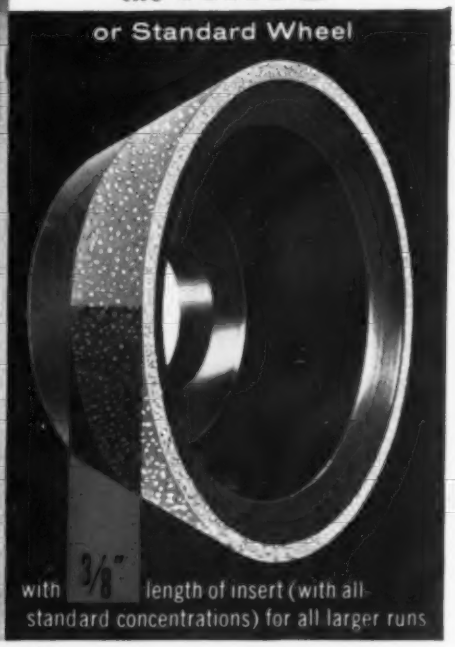
Now A.I.T. Diamond Tool

Announces an exclusive new concept for purchasing diamond wheels—

The EXACT-O-WHEEL

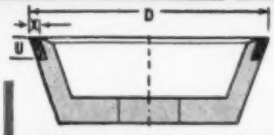
which lets you buy just the exact amount of grinding performance for any specific standard production job you have in mind. No more need to store expensive, partially used up diamond wheels on your shelves . . . now you can buy just the amount of diamond cutting you need for any job—short runs, medium runs or larger runs, tailor made to suit YOUR production.

There are now 3 measures of diamond grinding available in the Flaring Cup Wheel (D11V9)

the COMPACT	*the* ECONOMY	*the* KING
		
with 1/8" length of insert (with 100 concentration only) for short runs	. . with 1/4" length of insert (with 100 concentration only) for medium runs	or Standard Wheel with 3/8" length of insert (with all standard concentrations) for all larger runs

ALL EXACT-O-WHEELS are available in 1/16" and 1/8" depth of diamonds, in cup sizes of 3", 3-3/4", 4", 5" and 6".

There is an entire range of sizes . . . all available from stock, NOW . . . in plastic or aluminum backs, in natural and man made diamonds. You get all the qualities and grinding performance of the famous A.I.T. grinding wheel, yet you shave your costs with these versatile, exclusive wheels. See chart at right to choose just the wheel you need for YOUR next job, keep your diamond wheel dollars off the shelf . . . call, wire or write for Exact-O-Wheels NOW.



TYPE D11V9-FORMERLY D11B
Flaring Cup
Diamond in Periphery

Diameter (D)	Grade (U)	Length of Insert (U)	Depth of Diamonds (X)	Diameter (D)	Grade (U)	Length of Insert (U)	Depth of Diamonds (X)
3	Compact	1/8	1/16	4*	King	3/8	1/16
3	Compact	1/8	1/8	4*	King	3/8	1/8
3	Economy	1/4	1/16	5	Compact	1/8	1/16
3	Economy	1/4	1/8	5	Compact	1/8	1/8
3	King	3/8	1/16	5	Economy	1/4	1/16
3	King	3/8	1/8	5	Economy	1/4	1/8
3-3/4	Compact	1/8	1/16	5	King	7/16	1/16
3-3/4	Compact	1/8	1/8	5	King	7/16	1/8
3-3/4	Economy	1/4	1/16	6*	King	9/16	1/16
3-3/4	Economy	1/4	1/8	6*	King	9/16	1/8
3-3/4	King	3/8	1/16				
3-3/4	King	3/8	1/8				

*Available in King size only

A.I.T. Diamond Tool co.

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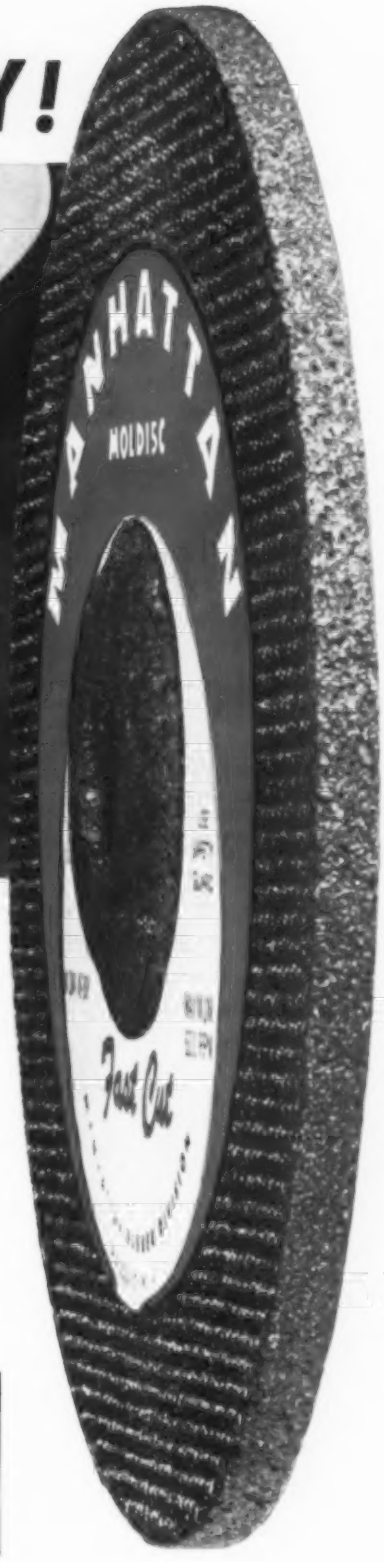
A *Fast Cut* To SAVE MONEY!



NEW MANHATTAN *Fast Cut* MOLDISC

DEPRESSED CENTER TYPE 27

- will remove more metal—
- grind more welds—
- get *more* work done *faster* than any other wheel of its type

STANDARD STOCK SIZES
SPECIFICATION A24-Q8-BR

DIA.	7"	7"	7"	DIA.	9"	9"	9"
THK.	1/8"	3/16"	1/4"	THK.	1/8"	3/16"	1/4"
HOLE	7/8"	7/8"	7/8"	HOLE	7/8"	7/8"	7/8"

Try The New MANHATTAN *FAST CUT* MOLDISC—
and *SAVE MONEY* on Your Next Job!

RM-1062

ENGINEERED RUBBER PRODUCTS . . . MORE USE PER DOLLAR

RM

WRITE TO ABRASIVE WHEEL DEPARTMENT
MANHATTAN RUBBER DIVISION • PASSAIC, NEW JERSEY
RAYBESTOS-MANHATTAN, INC.

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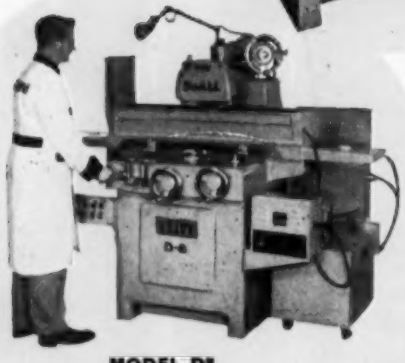
MODEL D6-1
Chuck Size
6" x 18"
Wheel Size
7" x ½" x 1¼"

A "STANDARD" IN ANY SHOP!

AT NEW LOW PRICES FROM $1450.00
MODEL DH-612



MODEL D8
Chuck Size
8" x 24"
Wheel Size
8" x 10" or 12"

MODEL D10
Chuck Size
10" x 30"
Wheel Size
12" or 14"

MODEL DH-612 (Manual)
Chuck Size
6" x 12"
Wheel Size
7" x ½" x 1¼"

See demonstration at ASTME Show, May

Type of chuck, SELECTRON® magnetic control and DoALL's "Cool Grinding" are optional.

DoALL PRECISION SURFACE GRINDERS

offer performance plus in accuracy, ease of control, versatility

You'll get high precision more easily with *any* DoALL surface grinder. And whether it's a hand-operated or a fully automatic production machine, it will help you save time, cut costs and improve your product. Now, in the four basic DoALL machines shown above, there's still more good news:

- **NEW SIZES**—from 6" x 12" to 10" x 30"
- **NEW SPEEDS**—up to 75 f.p.m. table travel
- **NEW WORK HEIGHT**—full 15" capacity
- **NEW RIGIDITY**—greater sturdiness
- **NEW CONTROLS**—still more convenience
- **NEW ACCURACY**—grind to tenths, with handwheel settings
- **NEW ATTACHMENTS**—full line of accessories, including "Cool Grinding"
- **NEW WHEEL CAPACITIES**—7", 8", 10", 12", 14"

What do these features mean to you? Just this: (1) DoALL has taken the guesswork out of surface grinding; (2) every part is precision ground, perfectly flat and parallel; (3) surface finish is guaranteed—10 micro-inches R.M.S. or better from standard wheels; (4) you can handle more parts more accurately (surface grinding, crush form grinding, etc.); (5) lowest grinding costs—always. *Ask for free bulletins or demonstration in your plant. Call your DoALL Store today or write:*

GR-30

The DoALL Company, Des Plaines, Illinois

This is a typical DoALL Store

Call Your DoALL Sales-Service Store

Machines and Blades | Surface Grinders | Power Saws — MACHINE TOOLS | CUTTING TOOLS | MEASURING INSTRUMENTS | SHOP SUPPLIES

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Metalworking on the move

The battle of automobile materials may be renewed with the advent of 1962 models next fall. Plastics might make headway as trim materials while the economy of using aluminum instead of steel will be a subject of discussion. P. C. Ackerman, vice president and chief engineer of Chrysler Corp. has been quoted as saying the margin between aluminum and steel has narrowed in instances and that Chrysler found in the manufacture of one part that it is cheaper to return to steel. The development of a process which laminates wood veneer to metal has already been used by one major automobile maker and may see even more use.

Oregon Metallurgical Corp., Albany, Ore., has achieved casting of 100% pure tungsten. It may mean a reduction of some 25% in the cost of producing metal for U.S. missiles. To get 100% pure tungsten by casting, the pour must be made within four seconds after a five-minute melting period. The molten tungsten is poured into a crucible of copper kept cool with running water to prevent its melting in the process.

Brass mills fabricating copper products for a wide variety of industries report their business has been slowly climbing out of the recession. Some companies say a slight pickup in orders has developed without any material help from auto producers.

The steel casting industry looks to process and product improvement through technical research, market research, and accelerated promotion to hold steel casting production at the 1959-60 level during a year of general business recession. Steel casting production is expected to increase in the third quarter of 1961 and a marked upturn is predicted for the last quarter of the year, according to Wilson H. Moriarty, president of the Steel Founders Society.

The Kennedy administration is preparing to enlarge the supply of American used machinery for underdeveloped countries. Plans are being studied for turning the over-age "surplus" of American machines into an asset. The program began in 1956 and by 1960, had reached a value of more than $31.2 million. Some U.S. officials have estimated that in 1961 alone, the figure may approach $100 million. All this material was government surplus. Most important component was machine tools. Of these, 75% were sent to India. The rest were allotted to 31 countries.

That on-again-off-again shipment of 45 grinding machines, worth some $1.5 million, to Russia has apparently been settled for sure. Commerce Secretary Luther Hodges revoked the Bryant Chucking Company's proposed export license which would permit them to make the shipment. Major argument in favor of the license was the contension that the machines produced by the Springfield, Vt., firm can be duplicated by Western European nations who don't feel so strongly about supplying Russia equipment. It was generally agreed that Russia could not produce the equipment itself.

World copper supplies exceed demand by some 150,000 tons a year, says Sir Ronald Prain, chairman of Rhodesian Selection Trust and Roan Antelope Copper Mines, Ltd. In New York, Cerro Corp. said it was negotiating for funds to bring its Rio Blanco copper property in Chile into production. But Robert P. Koenig, president, indicated it would be five years before the facilities' projected output of 65,000 tons yearly could be marketed.

EXOLON

BARREL FINISHING ABRASIVES

ARE

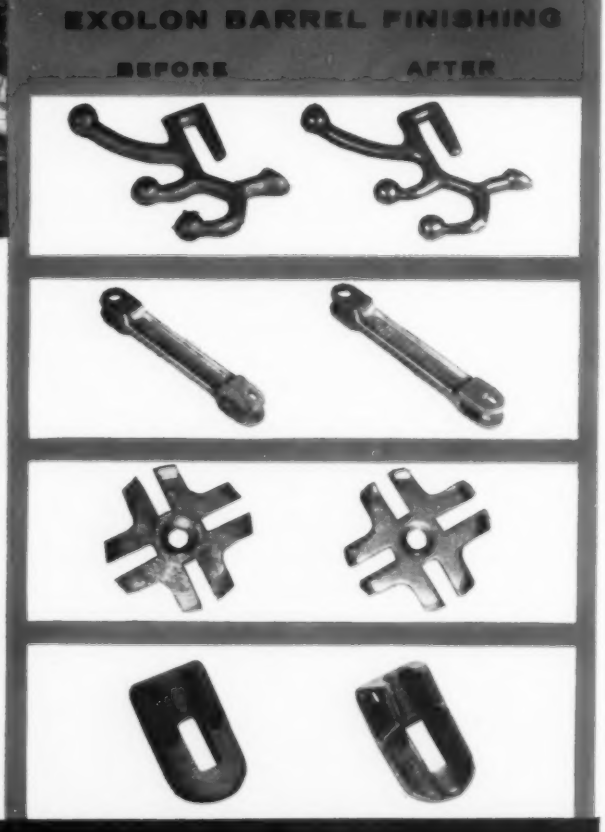
PRETUMBLED...

to give you these

ADVANTAGES

- ★ RUGGED SHAPES THAT STAND UP LONGER IN OPERATION
- ★ UNIFORM FINISHING RESULTS—ALWAYS, BATCH AFTER BATCH
- ★ NON-SCRATCH, PRECISION SMOOTHING OF YOUR METAL SURFACES
- ★ A SUPERIOR FINISH AT SUBSTANTIALLY LOWER COSTS

Let us Barrel Finish some parts for you — or we will be glad to send you trial lots of EXOLON Abrasive at Quantity discounts. Write for complete information.



The EXOLON COMPANY

1002 East Niagara Street • Tonawanda, New York

Manufacturers of SILICON CARBIDE and ALUMINUM OXIDE ABRASIVES

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Abrasive Engineer's Corner

ARTHUR RAKESTRAW • Contributing Editor

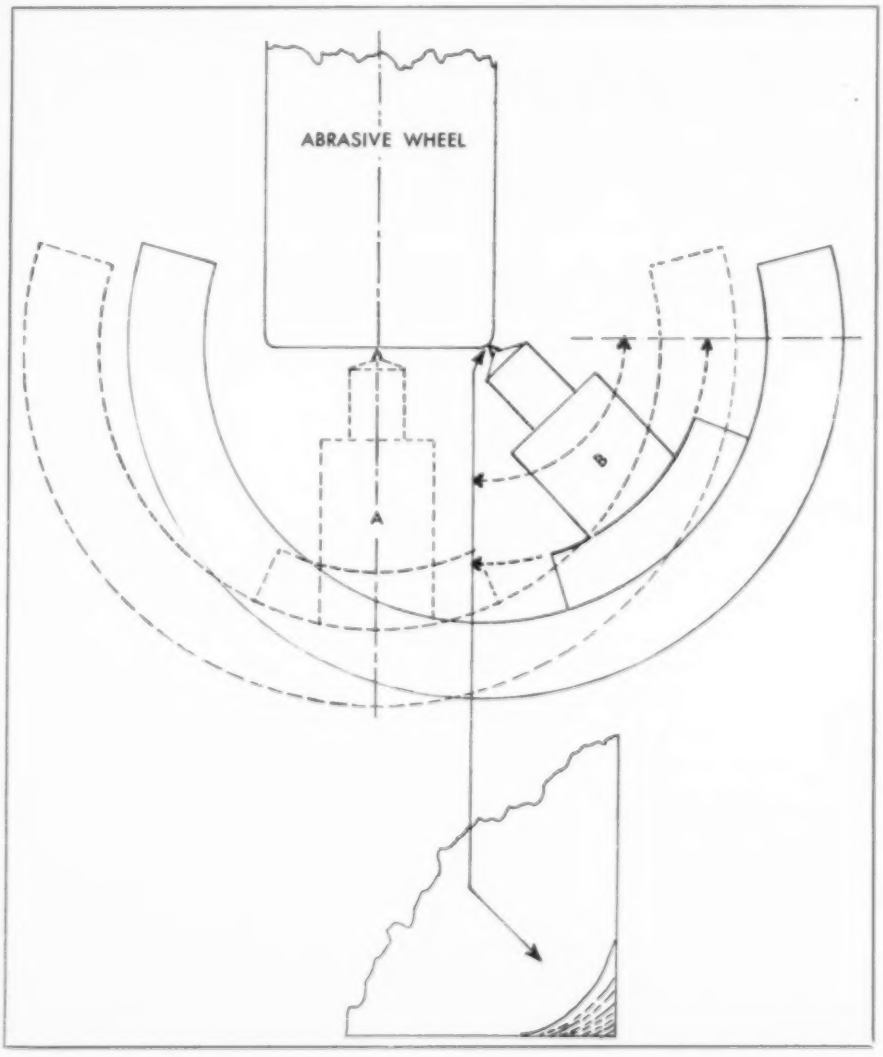
DRESSING A WHEEL RADIUS

• I'd appreciate your describing the proper way to dress a radius on an external grinding wheel, with a sketch if possible.—D. B. Hamtramck, Michigan.

I presume that you are particularly interested in a method of precision forming of radii on external cylindrical grinding wheels.

The common practice, where relatively few dressings were required, has been to dress the wheel corner offhand, with a diamond nib held in a dressing bar, or with a dressing stick of some sort. A template of the dressed corner is made by cutting cardboard or a piece of thin metal. The radius is checked for form either with a radius gage or on an optical comparator.

However, if very accurate radii are to be formed on a production job which requires frequent wheel dressing, it is essential to use a precision corner truing device.



I believe that most manufacturers of cylindrical grinding machines have such devices available. If not, they can be secured from manufacturers of truing devices.

The sketch shows a device, for this purpose, that can be easily attached or removed from the grinder table.

It consists of a pivoted diamond holder contained in a circular track. When truing the face of the wheel, the diamond holder is locked in the position designated as (A). After the wheel face has been trued, the table is moved toward the corner to be trued. With the diamond holder unlocked, it is free to be rotated 90 degrees either way.

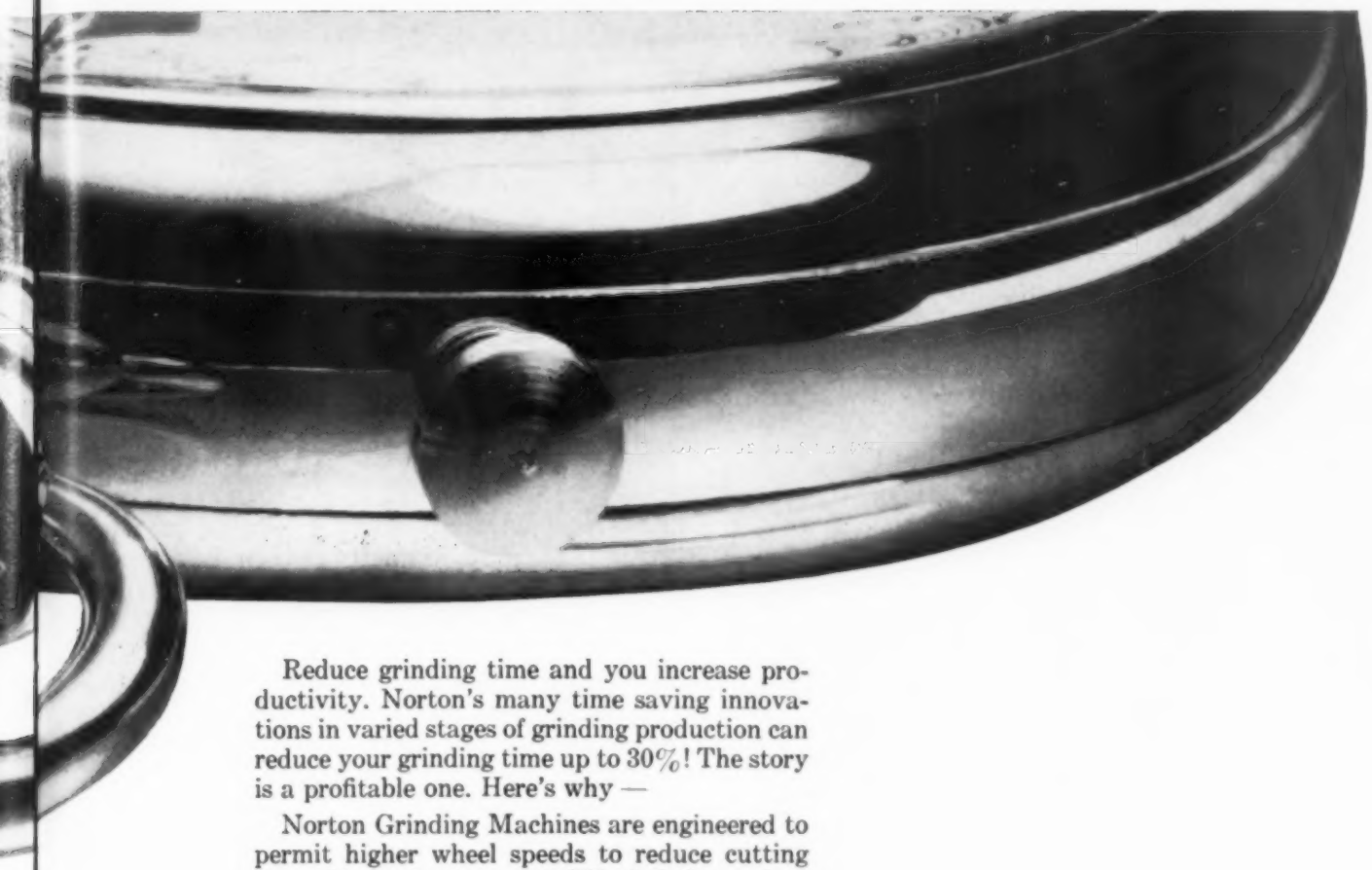
The sketch shows the relative position for truing the right wheel corner. With the table moved to the right beyond the wheel corner, it is then minutely moved to the left, the diamond holder being rotated from the right to the left, to center position, taking increments of cut until the diamond contacts the right side of the wheel at 90° from the center position.

The degree or amount of radius is obtained by adjusting the distance the diamond point extends beyond a fixed point on the diamond holder. In other words, if this fixed point were 1.000″ from the diamond point at zero radius, the required radius would be subtracted from 1.000″ to establish the extension of the dressing diamond beyond the fixed point.

When the unit is properly operated, radii on both wheel corners can be rapidly formed, and the dresser can be removed to make way for the regular grinding operation.

Naturally, the dressing of the left-hand corner would be the reverse of the operation described. • • •

Time is the measure of productivity



Reduce grinding time and you increase productivity. Norton's many time saving innovations in varied stages of grinding production can reduce your grinding time up to 30%! The story is a profitable one. Here's why —

Norton Grinding Machines are engineered to permit higher wheel speeds to reduce cutting time. Norton's *Automatic Wheel Balancer* balances the wheel in *five seconds — on the machine.* You reduce time spent "grinding air" up to 85% because of Norton's *Automatic Wheel Contact Accelerator* which speeds the wheel to the work and compensates for work piece-diameter variation. Another advance is Norton's *Automatic Truing* which eliminates work interruptions and the *Automatic Wheel Wear Compensator* that stabilizes the grinding cycle.

Norton Grinders further add to your productivity by minimizing work spoilage with *Automatic In-Process Gaging.* In the case of surface grinders Norton *Higher Table Speed of 150 fpm* actually reduces grinding time up to 50%.

These are only some of the many reasons you can increase your productivity with Norton Grinders. They also offer accessories that literally transfer skills to machines — *ultra-fine feed,* and *automatic features* such as *steady resting, endwise locating, loading, constant peripheral wheel speed* and *hydraulically-operated feed screws* provide this competitive advantage.

The decision is yours — can you afford not to reduce the time it takes to produce your product? Can you afford not to increase your productivity? Contact your Norton man, NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 5.

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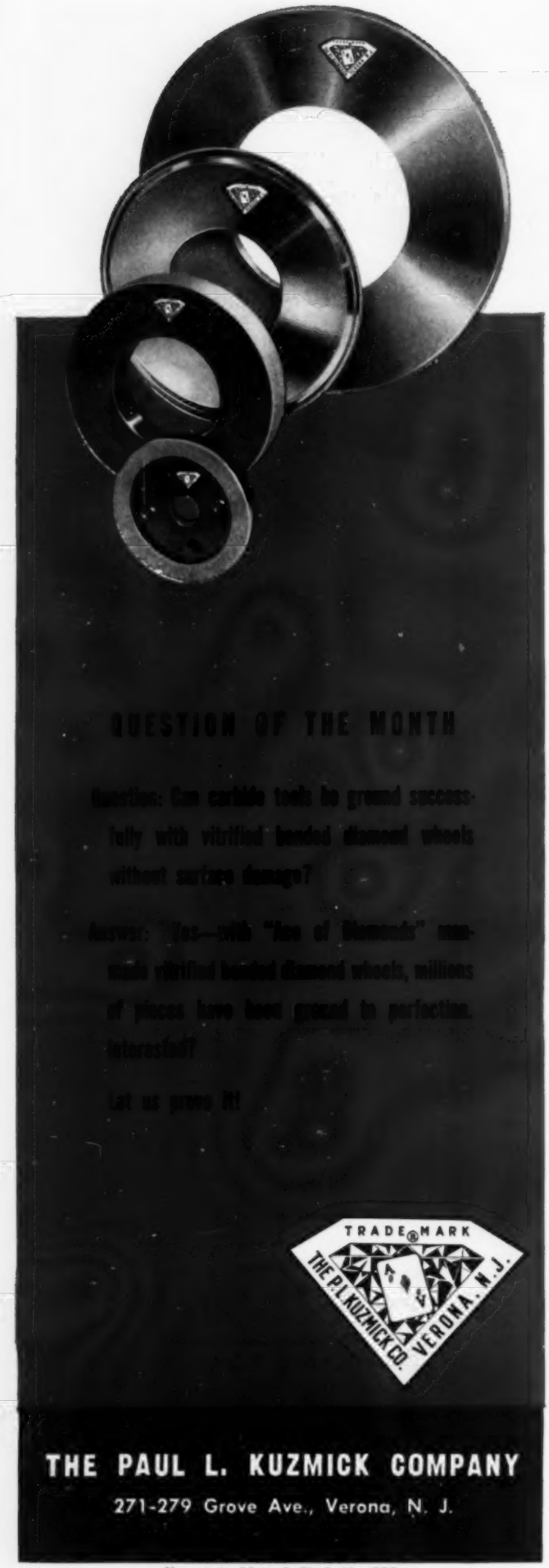

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Optical fining device shows metal potential

The use of wire cloth as an abrasive carrier during fining (a semi-final finishing operation on lenses) eliminates tool wear. Process has possibilities in lapping metals.

Special to GRINDING and FINISHING

● The introduction of adhesive-backed wire cloth as an abrasive carrier has eliminated tool wear in fining, a semi-final finishing operation similar to lapping, in the making of lenses. Similar devices may well be applied in the lapping of metals for generating curved surfaces.

The process, developed by American Optical Company, incorporates a throwaway wire cloth disc made by Reynolds Wire Division, National-Standard Company. The disc is made of 0.007" electrogalvanized steel wire woven to 30 x 30 mesh.

Applied between the fining tool and the workpiece, the wire cloth holds an emulsified abrasive solution. All abrasive action takes place at the interface of the wire cloth and the lens, with no wear on the tool.

Four basic advantages of the use of wire cloth as an abrasive carrier stand out:

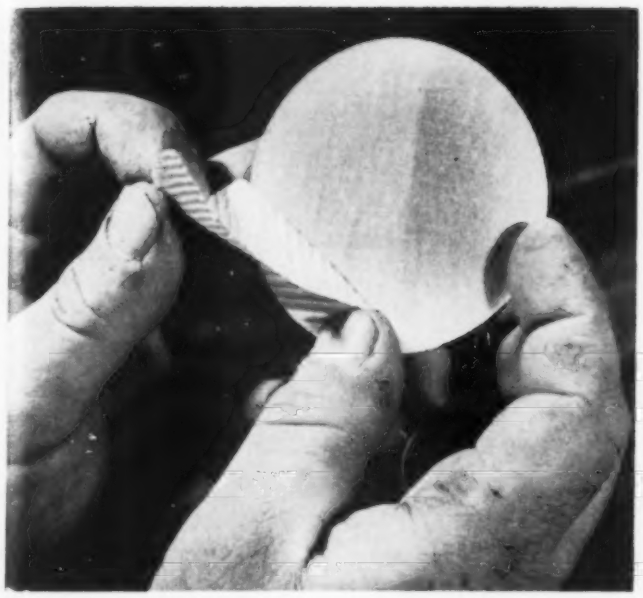
1. Tools no longer need to be retrued or replaced.
2. Since the uniform, predictable thickness of the wire cloth replaces random wear of the tool, automatic operation is feasible.
3. The abrasive is held in uniform contact across the interface between the work and the tool, eliminating thinning of the abrasive from centrifugal force of the revolving tool.
4. Time of the operation is cut.

The wire cloth is backed with pressure-sensitive adhesive and a protective paper. In operation, the cloth is cut to fit the tool. After the paper is removed, the cloth disc is applied flat on the tool face.

The tool is mounted in the bottom chuck of the fining machine, with the workpiece in the upper chuck. The abrasive slurry is pumped over the lens and the tool, which rotates in an eccentric pattern so that the abrasive is trapped in the cloth and the entire face of the lens is worked on.

Since the installation of this process at American Optical, reworking of lenses has been virtually eliminated.

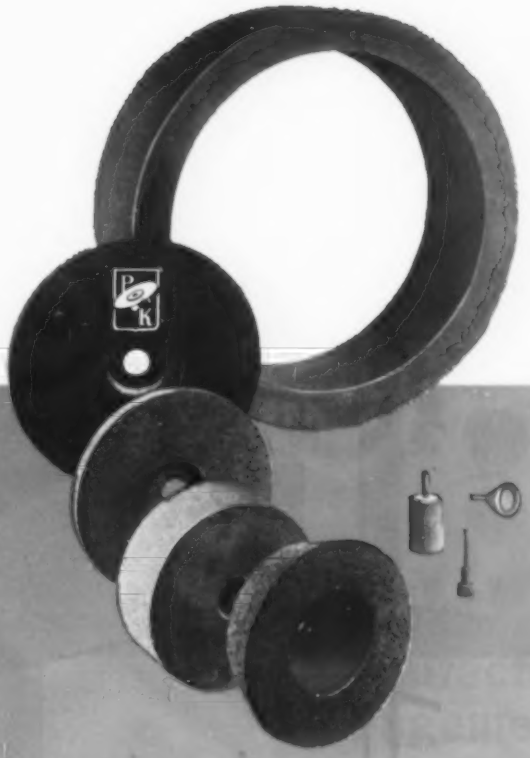
• • •



Stripping the protective paper from the wire mesh exposes surface covered with pressure-sensitive adhesive.

Wire cloth disc is laid over the tool surface and pressed down. Slight movement of the wires permits the cloth to conform smoothly to the curved surface.

Close-up of lens (above) and fining tool in operating position. Emulsified abrasive is pumped through tube over the lens, and flows over the wire-cloth-faced tool.



QUESTION: What is AGRABOND?

ANSWER: Agrabond is a combination resilient rubber-bond wheel having the metal removal qualities of a rigid resinoid wheel and the finishing properties of a flexible polishing wheel.

Want to know more with proven applications? Write for complete information on this revolutionary new concept in Grinding Wheels to:

PEKAY ABRASIVES, INC.
271 Grove Ave., Verona, N. J.

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Thompson's exclusive "CYBERMATIC PENDANT CONTROL" completely eliminates the elevating hand wheel

All vertical movement of the wheel head, both automatic and manual, on this modern Thompson 36 x 48 x 72 Type CX Plunge-Matic Grinder is accomplished effortlessly by dials on the Cybermatic Pendant Control.

This new pendant control performs the following functions: **Sets automatic down feed from .0002" to .006" in .0002" increments—sets the total amount of automatic down feed for stock removal from 0 to 1 inch through the entire 48" vertical capacity—controls automatic down feed increment (as pre-selected) at each reversal of the wheel head on cross feed or at each table reversal on straight plunge feed — controls a 20" per minute rapid traverse to the elevation of the wheel head—provides a push button to re-set the down feed range at operator's will — pre-sets a wheel dressing increment for automatic wheel trueing—compensates manually or automatically for wheel dressing —provides a master stop button for all movement.**

This Thompson machine is completely modern in every respect. Its features include the exclusive Thompson Hydra-Cool Hydraulic System with dual packless cylinders providing automatic cushioning. A separate automatic lubrication system for all sliding way bearings and tape bed way covers are standard equipment.

This modern Thompson grinder is both high powered and extremely accurate.

Further specifications will be furnished upon request.

PRE-LOADED
SELF-ADJUSTING
COLD RUNNING
ROTATIONALLY STABLE
VIBRATIONLESS
FREE FROM WEAR

Thompson has taken another important step toward the ultimate in accuracy and precision by obtaining the exclusive use of the world famous MALCUS BLOCK BEARINGS for their wheel head spindles. The notable advantages of these bearings are listed above.

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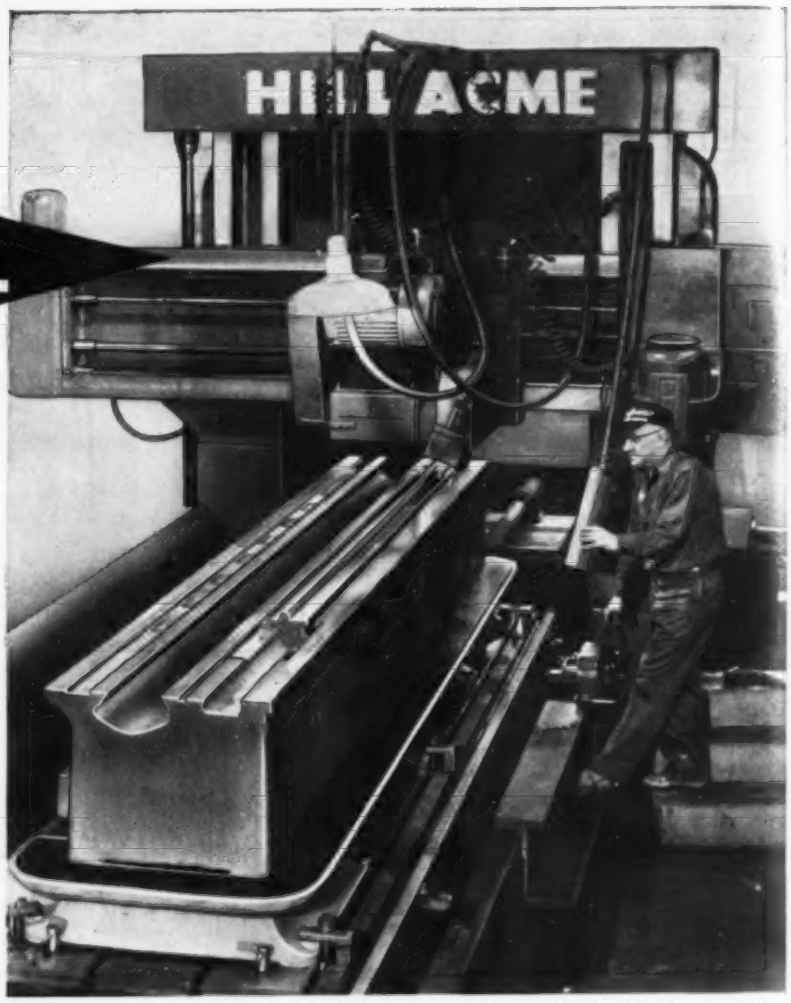
Are You Caught...

BETWEEN RISING LABOR COSTS AND CUSTOMER RESISTANCE TO INCREASED PRICES?

A prominent machine tool builder* now saves $1,138.10 in man hours on each spline hobbing machine by using a HILL ACME Surface Grinder to produce flat, parallel ways as compared with their old method of planing and hand scraping: –



Grinding "V" bed ways with a HILL Double Housing Hydraulic Surface Grinder.

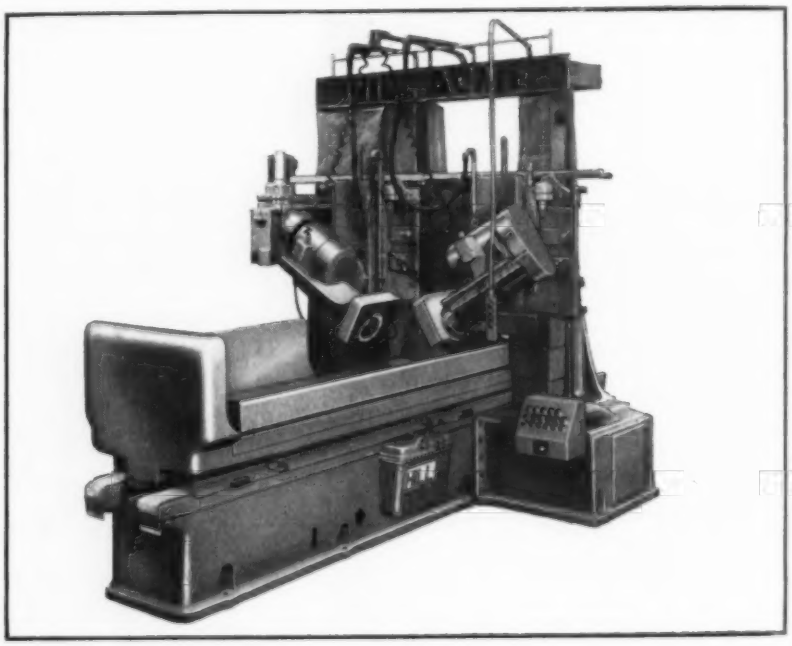
Here is the case history:

ITEM	METHOD	HOURS	RATE	TOTAL LABOR COST	
Bed 8'x72"	Scrape	96.0	2.35	$1,014.72	
	Grind	22.5	2.79	282.37	
				$ 732.35	Savings
Slide	Scrape	12.0	2.35	$ 126.84	
	Grind	.8	2.79	10.04	
				$ 116.80	Savings
Carriage	Scrape	25.0	2.35	$ 264.25	
	Grind	6.0	2.79	75.30	
				$ 188.95	Savings
Total man-hour Savings				$1,138.10	

The manufacturer reports these additional advantages:

1. A consistency of way accuracy assured.
2. Permits the use of integral hardened ways.
3. Gives a uniform oil film between way surfaces.
4. Improves delivery schedules.
5. A very favorable customer acceptance.

HILL ACME Heavy Duty Hydraulic Surface Grinders are adaptable to a wide variety of stock sizes having flat surfaces. Table widths are 24" to 60". Table lengths vary from 7 to 30 feet. Built in both horizontal spindle and vertical spindle design.



*Builders Name on request

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Manufacturers of: Grinding and Polishing Machines • Hydraulic Surface Grinders • Rotary Scrap Shears • "ACME" Forging • Tapping Machines • "CANTON" Alligator Shears • Bar-Billet Shears • "CLEVELAND" Knives & Shear Blades

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Where are we?

Yes! Just where are we? Suddenly this industry has come alive. It seems as though this has happened overnight, but it has been building up over a number of years. The recent impact of the industry's vigor has been emphasized by the upswing in business and the release of many new developments in the field. Abrasive machining is finding itself in its rightful position as the largest single group within the metalworking field.

In the recent months we have found ourselves in more and more conversations about testing, evaluations, developments and research. New heights are being sought and in many cases found. Stock removal by abrasives has caught on. More and more plants are using abrasive machining for greater stock removal. Developments which have been going on for years are either being completed or released for use in the field.

Abrasive machining equipment will, again in 1960, represent 42% of the metal cutting equipment shipped. This percentage was first reached in 1959 and appears to be just a step on the way up. Abrasive machines rate high in the surveys of old equipment still in use and, therefore, total application constitutes an extremely high percentage of the metalworking being performed today.

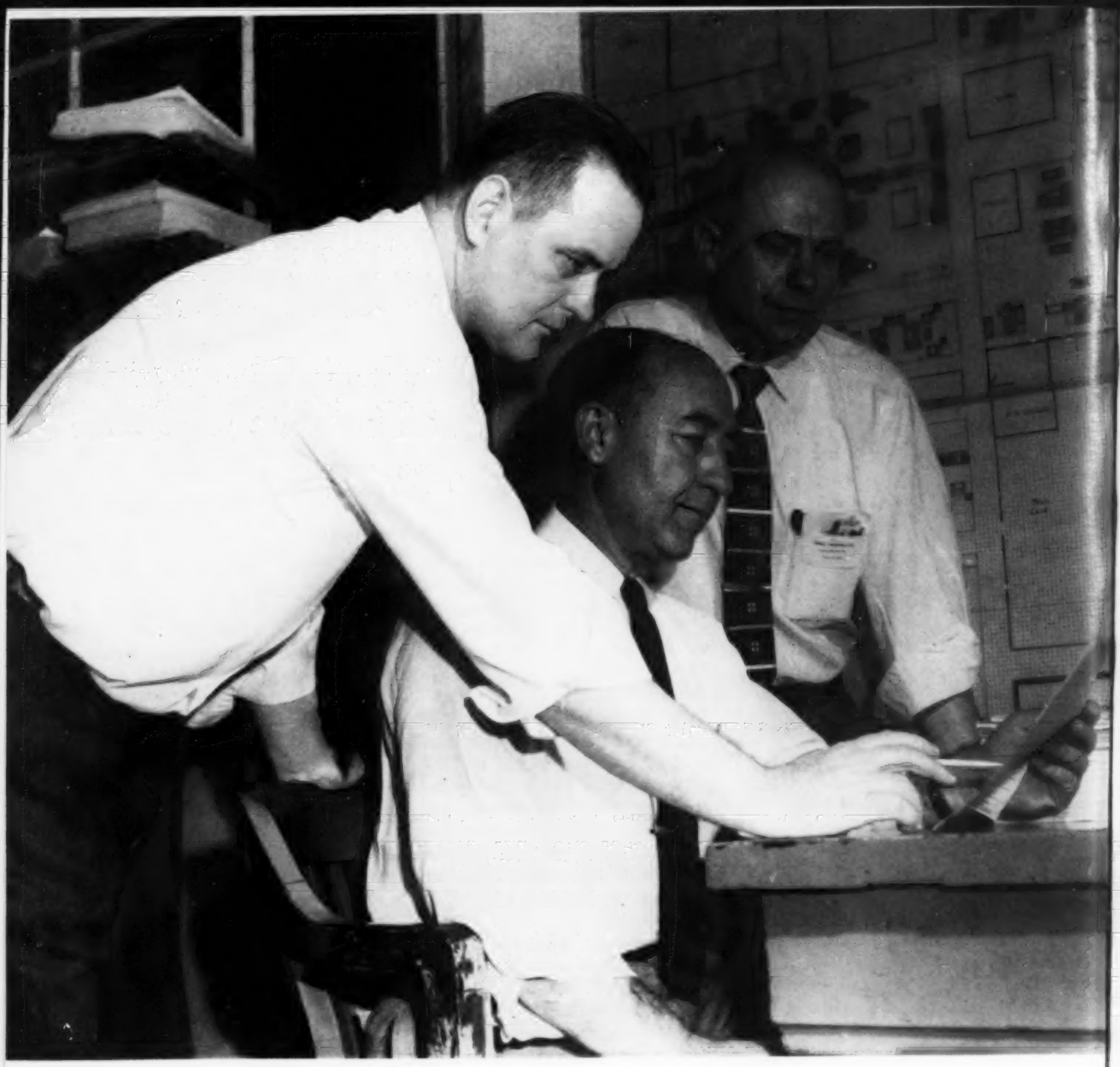
New research projects on both products and theory have been greatly increased. Along with this has been the breaking down of the old secrecy which formerly surrounded research even after conclusion. This is an indication of maturity in the industry. We are beginning to realize we must make new developments—release them—and go on to new projects or refinements before the competition can take advantage of what has been done in the past. We are begining to know where we are.

This brings us to a point we have made before. Research and development cost money which has to come from the price of the equipment or products sold. This does not mean they should be overpriced, but the price of the product should be determined by the value of the increased benefits to the user. This would provide the manufacturer with the increased revenue for research and development so that still greater advantages can be presented to the user.

Where are we? Well, I would say the bandwagon is going at a real good clip. For the user who wants to jump on, a word of caution. Don't grab for a loose string! Test and evaluate abrasive machining operations. Set up abrasive methods or use the new developments after you have satisfied yourself they have an economic advantage, do not discard them on price alone. For the manufacturer of equipment and products—ask and get a fair economic price for new developments so that you can continue research and development. Announce these developments. Don't look over your shoulder at the competition, but beat him to the next move.

W. W. Pattinson

Editor, Grinding and Finishing



Harry N. Werner (center), general foreman of SKF Industries' spherical operation, reviews results of test wheel operated on grinder with James M. Malone (left), abrasive specialist, and Andrew Borek, foreman.

The team at SKF which is responsible for evaluation of abrasive machining operations, has been very successful in boosting production, increasing stock removal, lengthening wheel life, improving quality and cutting costs

WHEEL EVALUATION TEAM

boosts production, quality and reduces costs

By JAMES M. MALONE, abrasive specialist, SKF Industries

With American industry facing stiffening competition from abroad—and a deepening profit squeeze at home—all sorts of programs to lift efficiency and production vie for the management spotlight. Yet successful programs need not always be brand new.

They can and do spring from such seemingly routine and familiar operations as grinding: specifically, a grinding wheel evaluation system. And when this results in measured production increases and savings—as it does at SKF Industries, Inc.—management recognizes that the competitive struggle for profits must still be won or lost on the line.

The leading ball and roller bearing manufacturer sets up its wheel evaluation system to cover new or modified equipment, along with standardized grinding machines.

By touching all three bases in an aggressive program pitting its abrasive specialists and engineers against machines and materials, SKF is able to point to meaningful dollar savings.

To set up your wheel evaluation system, first clearly define why you want to test grinding wheels. This breaks down the multiple facets of the problem. SKF pinpoints these reasons as increased stock removal per minute, increased wheel life, improvement of one or more quality characteristics, obtaining an alternate vendor, and so on.

Once you've got your objectives clearly outlined, you're set to critically examine your grinding operations.

I. FOR NEW OR MODIFIED MACHINES.

At SKF, test wheels for new or modified machines are bought with the over-all plan in mind that the wheel standardized will reflect the highest practical production per hour; cubic stock removal not to exceed the rated horsepower of the grinding wheel motor; and the capability to grind races within 70 per cent of the required quality tolerances.

Joint responsibility at SKF rests with the department foreman such as Andrew Borek, spherical operations, and the industrial engineer, James M. Malone, (the plant abrasive specialist assigned to the industrial engineering department) to obtain the proper grinding wheel specification, establish the grinding methods and techniques for the new or modified machines.

A. Selection of grinding wheel specification:

1. Based on previous experience of a similar grinding application, the department foreman and industrial engineer will select one or two specifications to be thoroughly tested. Additional specifications will be tested, if necessary.

   This theoretical approach is used for grinding applications of a foreign nature.

   The factors that influence the type of abrasive, grit size, hardness, structure, bond type and the modification of bond type, to be tested, are:

   a. Type and hardness of material to be ground
   b. Wheel dimensions (influencing the arc and the area of contact)
   c. Surface feet per minute of of the wheel and work

continued

d. Infeed to be employed
e. Tolerances to be maintained
f. Type of grinding i.e., form, surface cylindrical, oscillation, etc.
g. Type of coolant

The over-all experience of the industrial engineer enables SKF to minimize the number of different test specifications required.

B. Grinding wheel dimensions

The factors that affect the size of the wheel to be tested are:

1. Wheel guard dimensions (if any)
2. Available spindle revolutions per minute
3. Size of the work to be ground
4. Recommendation of the machine builder

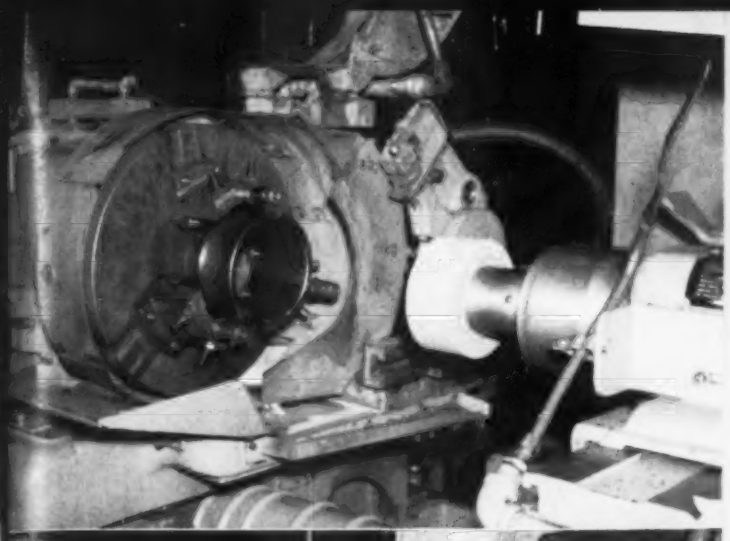
C. Testing the grinding wheel

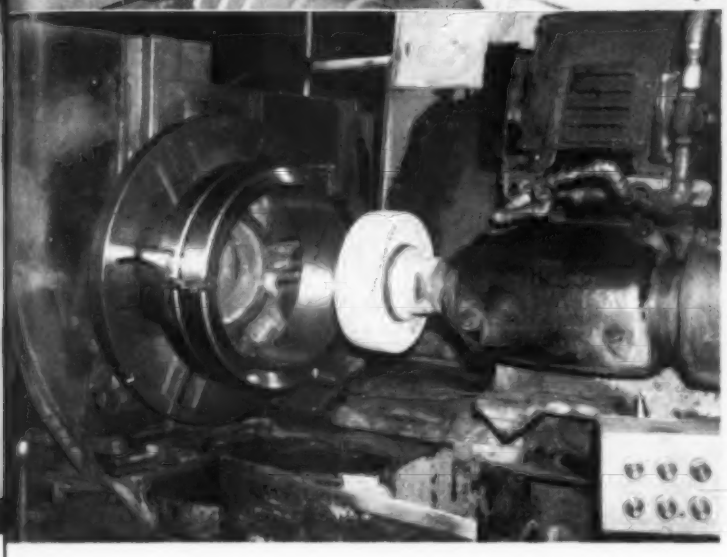
Here are the factors evaluated and analyzed prior to standardizing a re-test wheel on a new or modified machine.

1. Based on a previous analysis the approximate theoretical infeed is set on the machine.
2. Each race is gauged to establish the amount of stock to be removed.
3. The S.F.P.M. of the wheel and work has been ascertained (20 to 30:1 ratio) and the resultant R.P.M.'s are set on the machine.
4. Each grinding cycle is timed to establish the diametrical stock removal per minute.
5. Horsepower readings are made to be certain the stock removal per minute obtained does not require more than 100% of the rated H.P. of the motor. If this horsepower is exceeded on the test, then several alternatives are considered:
   a. Using a softer grade wheel
   b. Decreasing the infeed
   c. Increasing dressing speed
   d. Increase workhead speed (if possible)
   e. Reduce the arc and/or area of contact (this would also apply to improving finish)
   f. Increase compensation or increase H.P. capacity
6. Races are gauged each cycle to be certain the quality requirements are maintained.
7. The minimum size to which the wheel can be used is established (where the stock removal/min decreases drastically from the averages of the previous cycles).
8. The wheel wear ratio is established, from the total stock removed versus the total wheel wear for the determined life of the wheel.

There is, of course, a limit to the number of specifications that can be economically tested on new equipment before the installation of time standards. The objective here was to obtain optimum stock removal rates and maintain the desired quality characteristics with a minimum of engineering time. based on previous test records, the area of testing can be quickly narrowed down.

Illustration No. 1 is a 3216 Bryant with a 5 x 2½ x 2, A60L7V mounted on the spindle.





James M. Malone (right), SKF Industries' abrasive specialist, observes degree of loading present in test wheel mounted on a grinder. Malone is assisted by machine operator, Charles Hackett.

Illustration 1. 3216 Bryant grinder.

Illustration 2. Internal sphere grinding of outer race.

Shown in Figure No. 1, is the form used in wheel tests performed on the 3216 Internal Grinder.

The data indicated on the three graphs was compiled from wheel tests performed on a new piece of equipment.

You'll note that five specifications were tested before standardization was possible on this extremely difficult grinding application.

The following conclusions then become evident from an analysis of the graphs:

1. The hardest wheel grade (J) generated the most horsepower. However it does not reflect the most stock removal per minute.
   a. Using the hardest wheel (J) for this application would result in inefficient use of available H.P. and increase the grind time considerably.
2. The coarsest grit size (36) exceeds the horsepower capacity.
3. Operating the grinding wheel at 5,000 S.F.P.M. exceeds the rated horsepower.
4. Employing a radial infeed of more than .45 m/m/minute exceeds the H.P. capacity.
5. 13 to 15:1 is the most efficient wheel to work S.F.P.M. ratio (this ratio is a definite deviation from the SKF normal of 20 to 30:1).

II. FOR STANDARDIZED EQUIPMENT.

Test wheels obtained for standardized grinding machines are processed, for the most part, in the same manner as those for new or modified equipment.

The races or hours/wheel, stock removal/min., tolerance limits maintained, S.F.P.M. of wheel and work, etc., are all factors that have been established with the standard wheel.

Shown in Figure Two is a typical SKF form used with wheel tests performed on a standardized outer race sphere grinder.

After testing a representative number of wheels, the wheel performing best is placed on the SKF standard wheel list. Due to improvements indicated in stock removal/min., wheel, etc., the time standards are revised accordingly. If the test wheels from several vendors are equal in all respects, orders are placed alternately with each vendor. If a wheel from one vendor is superior, then all orders would be placed with that vendor.

Here are the summarized results of a wheel test conducted on an established internal sphere grinding machine 460 m/m to 680 m/m O. D. range of work is processed:

First Grind Operation

	Previous Standard Wheel	Test Wheel
Size	12x3x5	12x3x5
Specification	A46K8B	A-54-L8V
Aver. S.F.P.M. (Wheel)	6600	5900
Aver. S.F.P.M. (Work)	300-Aver. Thru Range—	260
Aver. S.F.P.M. (Ratio)	22:1	22.8:1
Diametral Infeed In m/m/min.	.25	.38
Stock Removal Aver. Cubic m/m/min.	4,500	10,000
Quality	—	maintained closer tolerances.

continued

3216 Bryant

Machine # | Code | Operation | Bearing Size

Wheel Dimension | Specification | Vendor | R.P.M. Wheel Work | S.F.P.M. Aver. Work Wheel

Wheel Diameter
Start Finish

S.F.P.M. Ratio

Feed Settings
Rough Finish
# #

Diametral Travel/N.000" and time in Mins.

Prior to 1st. Dress
Prior to 2nd. Dress
After Last Dress

Aver. Travel | Aver. Time

Drift Time Mins.
Rough
Finish

Compensation in .000"
# of compensations

Inspection Results
Size | Micro inch Finish
Out of Round | Appearance
Taper
Bore Square

The Reverse side for Cycle Recordings

DATE

GRINDING WHEEL STANDARD SHEET

DEPT. TEST MACH. CODE

VENDOR WHEEL SIZE SPEC.

Rgh. Size	Finish Size	Total Stock Rem.	Grind Time	Stock Rem. mm/min

WHEEL WEAR RATIO:

TOTAL WHEEL WEAR: TOTAL STOCK REMOVED

MACHINE SET-UP DATA

R.P.M. S.F.P.M. S.F.P.M. Ratio

Feed Gears Pulley Setting Theoretical Diam. Infeed

QUALITY STATISTICS

Size	Square
O.R.	Radius
V Pt.	Location
Square	Parallel
Groove Wobble	Micro-Inch Finish
Bore Square	Appearance

Standard Stock Removal mm/min.
-
+ % Variation Obtained With Test Wheel

REMARKS

ENGINEER

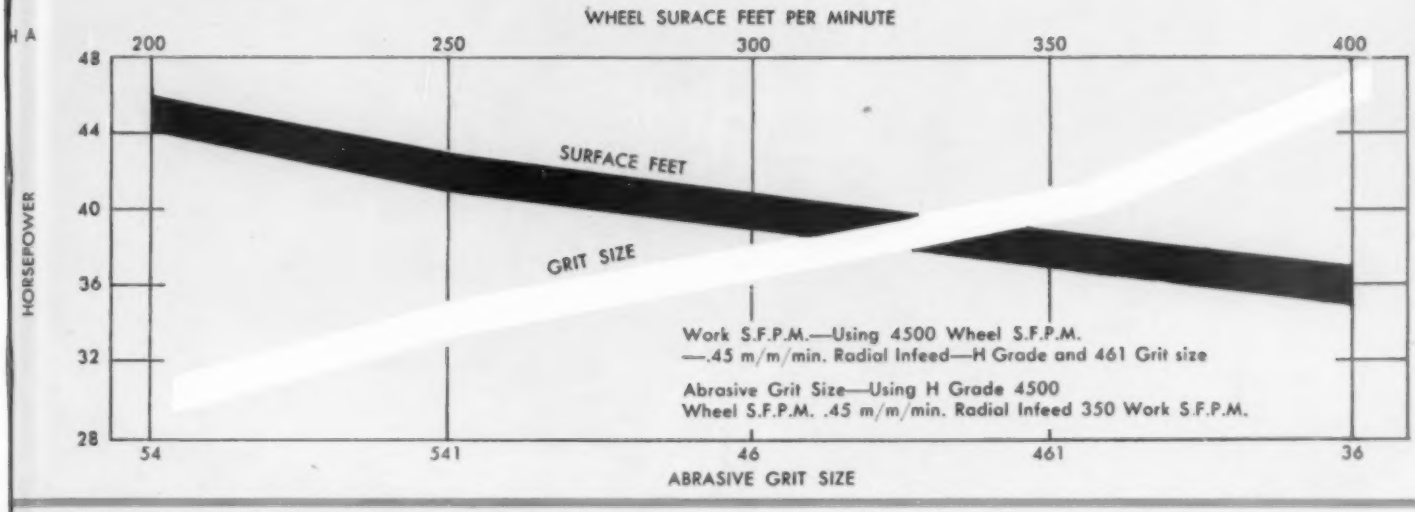
Using aluminum oxide type abrasive with the vitrified bonded wheel in place of the resinoid wheel enabled SKF to obtain these advantages:

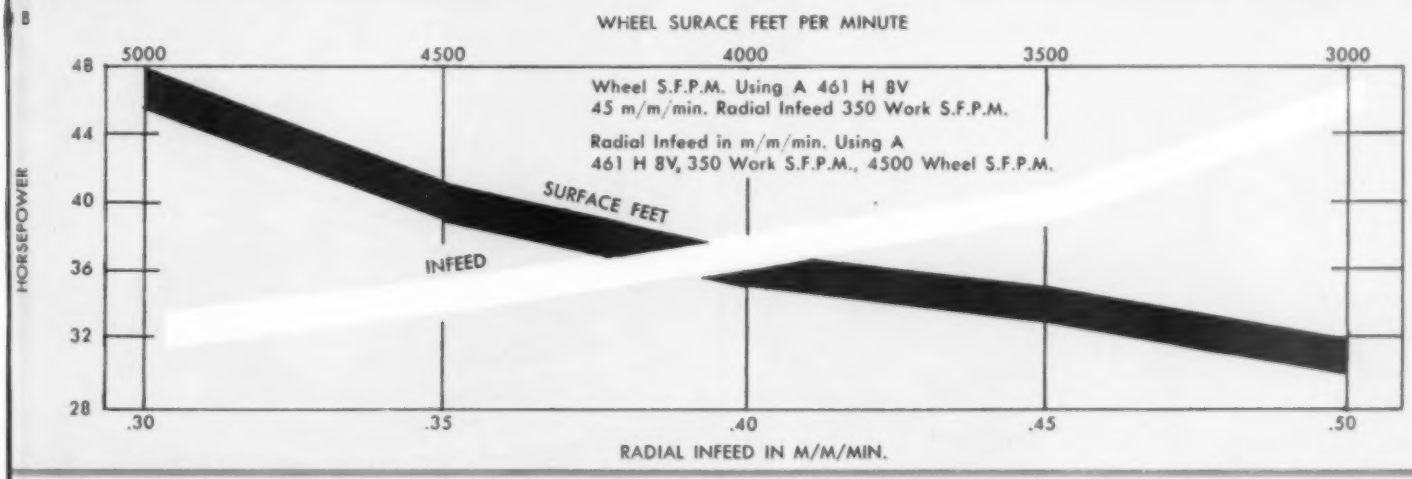
1. Increase Production 45%
2. Increase Stock Removal/min. 122%
3. Increase Wheel Life 56%
4. Decrease Abrasive Cost/Race 52%
5. Maintain Closer Quality Tolerances
6. Decrease the Material Expense Budget

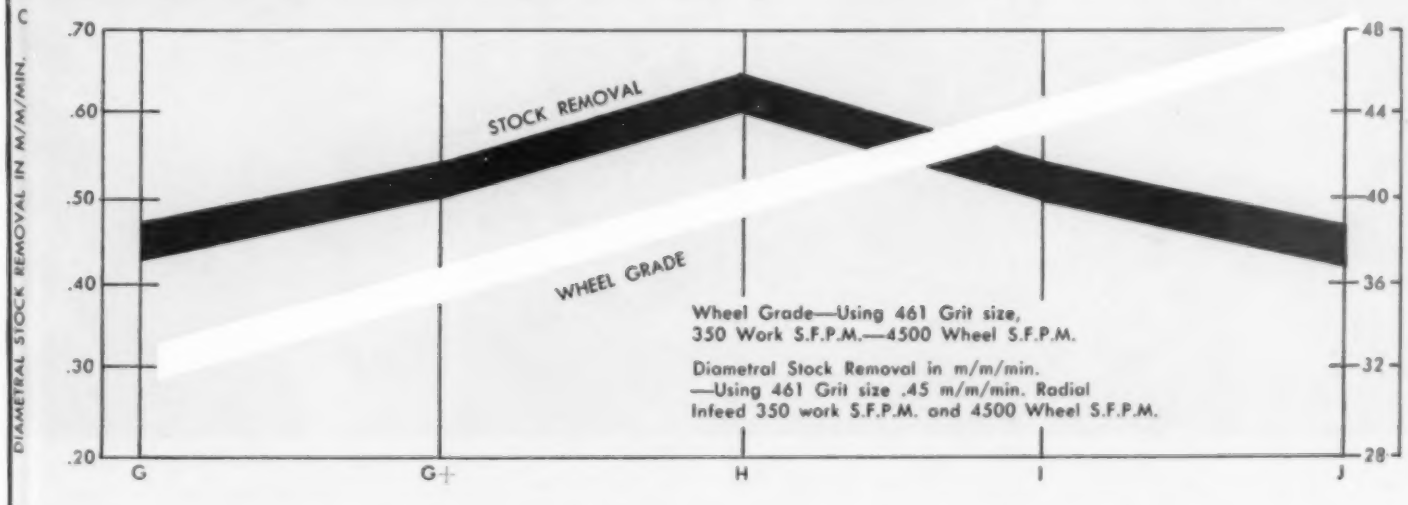
Illustration No. 2 is a view of a grinder with the A-54-L8V wheel mounted on the spindle.

The conclusion is inescapable: test wheels and an evaluation system are of considerable importance to SKF. Without a wheel specification approaching the optimum, the result of many diligent hours of machine design work may be minimized.

Proper wheel specifications are vital in the continuous search to make better bearings at less cost. This program enables SKF to constantly improve its position in the competitive market. • • •


A
WHEEL SURACE FEET PER MINUTE
200
250
300
350
400
48
44
40
36
32
28
HORSEPOWER
SURFACE FEET
GRIT SIZE
Work S.F.P.M.—Using 4500 Wheel S.F.P.M.
—.45 m/m/min. Radial Infeed—H Grade and 461 Grit size
Abrasive Grit Size—Using H Grade 4500
Wheel S.F.P.M. .45 m/m/min. Radial Infeed 350 Work S.F.P.M.
54
541
46
461
36
ABRASIVE GRIT SIZE


B
WHEEL SURACE FEET PER MINUTE
5000
4500
4000
3500
3000
48
44
40
36
32
28
HORSEPOWER
Wheel S.F.P.M. Using A 461 H 8V
45 m/m/min. Radial Infeed 350 Work S.F.P.M.
Radial Infeed in m/m/min. Using A
461 H 8V, 350 Work S.F.P.M., 4500 Wheel S.F.P.M.
SURFACE FEET
INFEED
.30
.35
.40
.45
.50
RADIAL INFEED IN M/M/MIN.


C
.70
.60
.50
.40
.30
.20
DIAMETRAL STOCK REMOVAL IN M/M/MIN.
STOCK REMOVAL
WHEEL GRADE
Wheel Grade—Using 461 Grit size,
350 Work S.F.P.M.—4500 Wheel S.F.P.M.
Diametral Stock Removal in m/m/min.
—Using 461 Grit size .45 m/m/min. Radial
Infeed 350 work S.F.P.M. and 4500 Wheel S.F.P.M.
48
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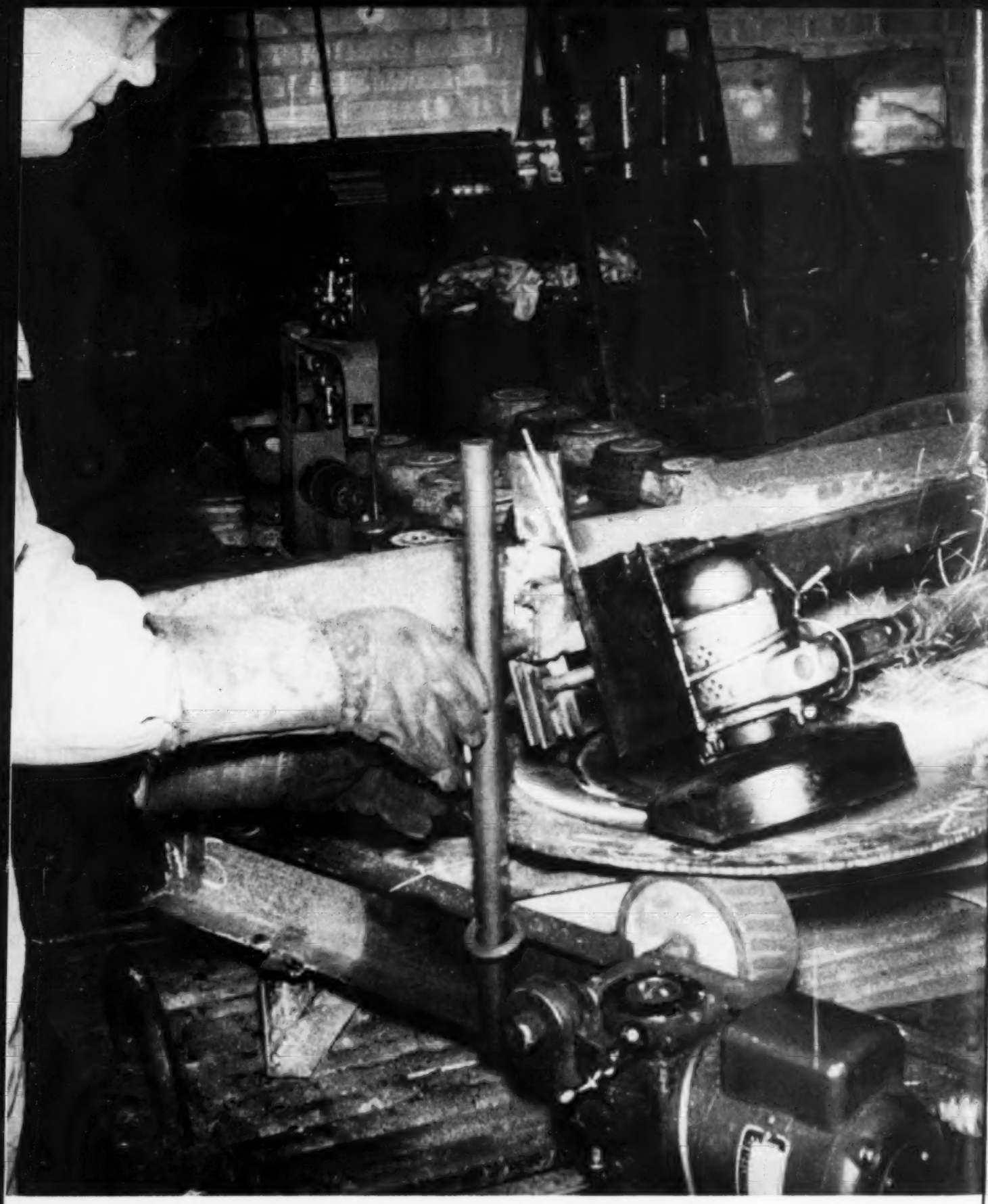


The testing unit in operation. A triangular frame supports the spindle and flange on which the test plate revolves. The drive wheel and motor are in center foreground. Behind the grinder is a threaded crank for changing the angle between grinder and plate. The operator does not need to touch the test unit while it is working. The grinder arm is free to move vertically, is stopped from rotating by the upright.

Portable wheel testing: a new approach

By WILLIAM L. WAGNER, Engineer, General Erection Department
Chicago Bridge & Iron Company

Simply-fabricated equipment for testing portable grinding wheels provides accurate comparisons of performance for minimum investment.

● The difficulties of objective comparisons of portable grinding wheels are well-known. These wheels are used under all possible conditions, by all kinds of operators, and in circumstances that do not require skill. Pressure applied varies with the operator, the time of day, and the condition of the wheel. Quantity of metal removed is at best an estimate. Everything considered, this is not an encouraging outlook for impartial testing.

Nevertheless, annual purchases of thousands of flaring cup and depressed center grinding wheels, for Chicago Bridge & Iron Company operations throughout the United States and the non-communist world, indicated a need for a test program to encourage standardization.

Though there was no reason to change the system of local purchase of these wheels, it was felt that some guides to supplement the opinions of the foreman, superintendent, or purchasing agent would be of benefit to the company.

The testing program and the equipment that were developed, with modifications, could be employed by any volume user of portable grinding wheels.

Purpose and Scope

The test program was originally designed to determine the most economical Type 11 and Type 27 grinding wheels, and to compare the efficiency of the two types.

At the conclusion of the first series of tests, it appeared to be more feasible to prepare a list of acceptable wheels from which the local management could select whatever was best on the basis of local conditions.

Each of 24 manufacturers was asked to recommend his best Type 11 (flaring cup) and Type 27 (depressed center) grinding wheels for "snagging heavy welds and torch cuts on mild steel."

Two wheels of the recommended specification in each type—four wheels in all—were purchased from each manufacturer. Test wheels, in the conventional sense, were not used. While this procedure increased the cost of the test by perhaps $300, it also kept the company out of even an implied obligation to any manufacturer.

The Type 11 wheels were 6/4-¾ x 2 x ⅝-11, mostly 16 grit resinoid aluminum oxide, in grades O to R, and 4-6 structure. The Type 27 wheels, 7 x ¼ x ⅞, were of generally similar specifications, excepting that most of them were 24 grit rather than 16.

Developing Test Procedures

The major problem in developing the test procedures and equipment was to rationalize the variables encountered in portable grinding.

For instance, about two-thirds of the portable grinding on Chicago Bridge & Iron jobs is done in the vertical position, with 20% in the down position and 15% overhead. For the test, the down position was selected as the most practical.

Selecting work pressure was another problem. When the apparatus was completed, it was found that the weight of the grinder mounted on the arm was 27 pounds. Because an operator working in the down position usually guides and controls the grinder

continued

without exerting any significant pressure on it, this was finally chosen as the test pressure. It is entirely possible that any consistent pressure in the area of 25 pounds would work as well.

A third decision had to be made as to whether the wheel or the work would move. After considering the possibilities, it appeared more feasible to mount the grinder on a stationary arm and to have the work, a circle of weld bead laid down on a circular plate, rotating beneath it.

The test period of 30 minutes was chosen after several trials of shorter intervals as the shortest period which would produce a significant difference in the production of the wheels.

Test Equipment

The essentials of the test unit were the mechanism for driving the test plates, the grinder and the device for holding it, and the test plate itself. The equipment was planned to duplicate actual conditions as closely as possible.

The drive mechanism was an old rubber contact wheel powered by a variable-speed electric motor. This enabled the test operator to hold the plate at a reasonably consistent rate of rotation. Mounted under the grinding wheel, the drive wheel turned the test plate without slipping, was much simpler to fabricate than any geared drive would have been.

A Rotor air grinder was used for the tests. An interesting sidelight is that when the grinder was equipped with a standard ½″ hose other units on the line would "bleed" air from it and cause the grinder to slow down.

When the hose size was increased to 1″, constant air pressure at approximately 100 psi could be maintained.

The holder was essentially a U-clamp mounted on an arm extending from an upright on one side of the test unit. A second upright kept the arm from rotating with the test plate. Originally this was mounted to keep the grinder at a constant 30° angle with the plate. Later it was modified so that the angle could be adjusted.

The test plates (A283, grade C steel) were 22″ in diameter and ¼″ thick, with ¼″ of weld bead (E6010 rod) 3″ wide in a 14″ circle on the top. Warping of the plates during welding required an added heat-treating and straightening operation, but this had no effect on the test results.

Auxiliary equipment included an accurate scale, a time clock, and a Vibra-Tak for checking the rpm of the grinder and the test plates.

The testing unit was fabricated for nominal cost from materials readily available in most shops.

Test Procedures

The basic test procedure for both types of wheels involved weighing both the wheel and the test plate, mounting the wheel on the grinder and the test plate on the spindle, grinding for 30 minutes, and reweighing both the wheel and the plate to determine wheel wear and amount of metal removed. The detailed procedure for Type 11 wheels are shown in the table on page 46.

For Type 11 wheels there was a break-in period of 5 minutes to remove the sharp corner of the wheel. The angle between the wheel and the test plate was maintained at 30°, as recommended by the manufacturers, for the entire period.

For Type 27 wheels there was no break-in period, and the angle between the wheel and the work was varied at five-minute intervals from 15° to 22½° to 30° though 15° is the recommended angle. Held at a constant angle with the work, the depressed-center wheel tended to ride up over the work and polish it, rather than grinding it.

For either type of wheel, whenever the weight of metal removed by the two submitted by a manufacturer varied by more than three ounces, one of the wheels was re-run. Results of the three tests were averaged for a composite figure. Eight wheels, all of the flaring-cup type, were re-tested in this fashion.

From the weights of metal removed and of wheel worn away, a ratio indicating wheel performance can be calculated. This, however, is not so important as the comparative cost of removing one pound of metal, which was the figure used for comparison. The latter figure was calculated by adding together wheel cost, labor cost, and overhead, and dividing their sum by the pounds of metal removed.

Results and Observations

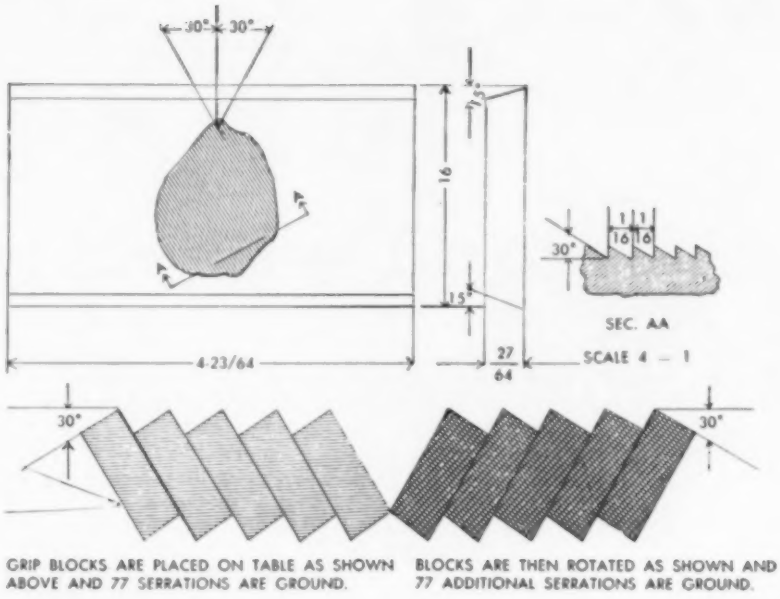
As a result of the tests, nine brands of Type 11 wheels were recommended to the districts as acceptable. Type 27 wheels, which constituted about 20% of the total units purchased in 1960, were recommended only for special situations.

Since most of the factors in calculating the cost per pound of metal removed remain constant, the wheel removing the most metal was generally the most economical. Wheel wear as such did not prove to be a significant factor; in fact, long wheel life could be a problem.

Statistically, testing more wheels of each make, or further testing of the nine brands recommended, would have been desirable. The first course was not regarded as feasible in this situation, and the second will be accomplished to a degree by reports of field experience. • • •

TEST PROCEDURES FOR TYPE 11 GRINDING WHEEL

1. Run new wheel 5 minutes on metal to wear down sharp corner.
2. Weigh wheel and record weight.
3. Weigh test plate and record weight.
4. Check grinder rpm before mounting wheel.
5. Mount wheel on grinder. Use revolving guard.
6. Mount test plate.
7. Set clock for 30 minutes.
8. Start turntable—counter-clockwise.
9. Lower grinder slowly on to turntable.
10. Observe testing.
11. Check rpm every 10 minutes with Vibra-Tak.
12. At end of 30 minutes lift up grinder and shut off.
13. Turn off turntable.
14. Remove the wheel.
15. Weigh wheel and record weight.
16. Remove the test plate.
17. Weigh test plate and record weight.



Crush-dressed wheel on surface grinder grinds teeth in grip block inserts for tensile testing machine at five times the rate of a shaper. Comparative insert life not available, as ground units are still in use after five weeks. Grinding eliminates warpage, tooth oxidation, tooth breakage.

Sketch of grip block.

Section AA. Scale 4:1.

Surface grinder replaces shaper

By WILLIAM W. WILSON • Huntington Alloy Products Division • The International Nickel Company, Inc.

● Baldwin tensile testing machines are used extensively in quality control at Huntington Alloy Products Division of The International Nickel Company. Each machine uses four grip block inserts to insure positive gripping action on pieces being tested to tensile failure.

International Nickel alloys have high tensile strength, requiring extreme pressure on the grip blocks. When the teeth in the blocks were formed by shaping and heat treating, tooth and block breakage was a continuing problem. Production rate for making the blocks was only three per eight-hour shift.

When the teeth were form-ground after heat treating, production jumped to fifteen per eight-hour shift. Comparative life cannot be determined, as the first set of blocks is still in use after five weeks, far exceeding the work life of blocks processed by the old method. Breakage has been eliminated. Grip blocks can be reground after use, and need not be discarded.

Present grinding method with 1″ wide wheel requires ten passes to grind teeth in block. With 2″ wheel, only six passes will be necessary.

Old Method—Procedure:

Place workpiece in shaper vise at 30° angle to parallel with tool. Cut 77 diagonal serrations across face.

Rotate workpiece 60° (30° angle with parallel in opposite direction). Cut 77 diagonal serrations. Heat treat to 85 scleroscope.

Old Method—Problem:

Oxidization of tooth tips caused tooth breakage, often in first use. Blocks often warped by heat treat. Production rate three per eight-hour shift.

New Method—Procedure:

Heat treat blank grip blocks to 65 scleroscope. Surface grind to remove warpage and oxidation. Crush dress 16 serrations, .036″ deep, into face of 1″ wide grinding wheel (vitrified aluminum oxide, 100 grit, K grade, 8 structure). Set up blocks (5 per group) on 12″ x 36″ surface grinder (see sketch).

Table speed of 10″ per minute.

Wheel speed 5500 sfpm.

Fives passes for each set-up.

Rotate blocks 60° as above.

Grind second set of serrations (five more passes).

New Method—Advantages:

Rate 15 per 8-hour shift, five times previous rate.

Block life greatly increased—present sets in use 5 weeks, and still going.

Oxidation, warpage, and tooth breakage eliminated.

Blocks can be re-ground after use, extending life further. • • •

Diamond wheels: which concentration?

By SKIP YOUMAN, general sales manager
A.I.T. Diamond Tool Company

Each diamond wheel application differs. Therefore, concentration should be considered when selecting wheels for these applications. Test conducted in the A. I. T. research department will help establish the conditions for application of the various concentrations.

● There is presently a trend of thought that 75 concentration diamond wheels will do the job of a 100 concentration diamond wheel on ALL applications. Tests conducted by the A.I.T. research department prove that with resin bonded wheels, 100 concentration is the only concentration which will successfully grind under all conditions.

It first must be kept in mind that the diamond alone is doing the job of stock removal. Bond is merely the holding element that retains the diamond as long as possible, allowing new diamonds to appear only when the surface diamonds are worn or have been released through pressure. Bond hardness must be considered for the specific operation in order to achieve the longest possible life from the diamond wheel.

Effect on Steel Grade Carbide

A test of flaring cups, type D11B 3¾" x 1½" x 1¼" hole D150 N100 B⅛ against 75 concentration wheel was performed on the multi-tooth cutter blade grinding of steel grade carbide. A Covel No. 12A universal cutter and tool grinder equipped with a one horsepower motorized spindle was used on this test. There was a great deal of difference between the performance of these two wheels, particularly when the area contact was not large. In this instance, the 75 concentration wheel showed profitable results as it offered between 85-90% of a life of the 100 concentration wheel. More thermo-heat was incurred by the 75, but it had no damaging effect on the carbide.

Effect on Cost Steel Grade Carbide

The same two wheels were then tested on a multi-tooth cutter blade of cast steel grade carbide. The actual grinding performance showed very little difference between the two wheels except for, again, a slightly higher thermo-heat generated with the 75 concentration. However, under high powered microscope, the cutting edge produced by the 100 concentration wheel was smooth, whereas the 75 concentration produced a saw-tooth edge.

The conclusion of this test after trying many different bond hardnesses under the same procedure, was that the 100 concentration is necessary on small area cast carbide grades in order to obtain an acceptable finish for the cutting edge. The 75 concentration did show up well for grinding steel grade carbides.

Tapping Operation

The same two wheels were then tested on a single point tool topping operation. In this operation, the 100 concentration wheel ground continuously with a minimum amount of thermo-heat. The 75 concentration wheel, on the other hand, produced an excessive amount of heat which was detrimental to the operation. Finish results were the same as the first test with the 75 concentration being unacceptable due to fine chipping on the cast grade carbide, as observed under 1500+ power inspection.

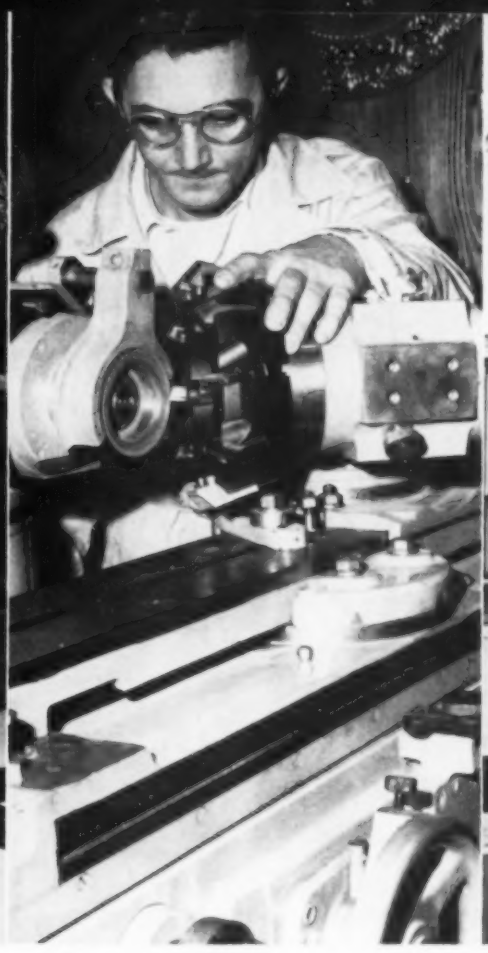
Effect of Traverse Speed

The 75 concentration wheel was then tried with a slower traverse speed. This increased the quality of the finish and reduced thermo-heat; however, it greatly increased the grinding time and reduced production. All of these were made under dry conditions.

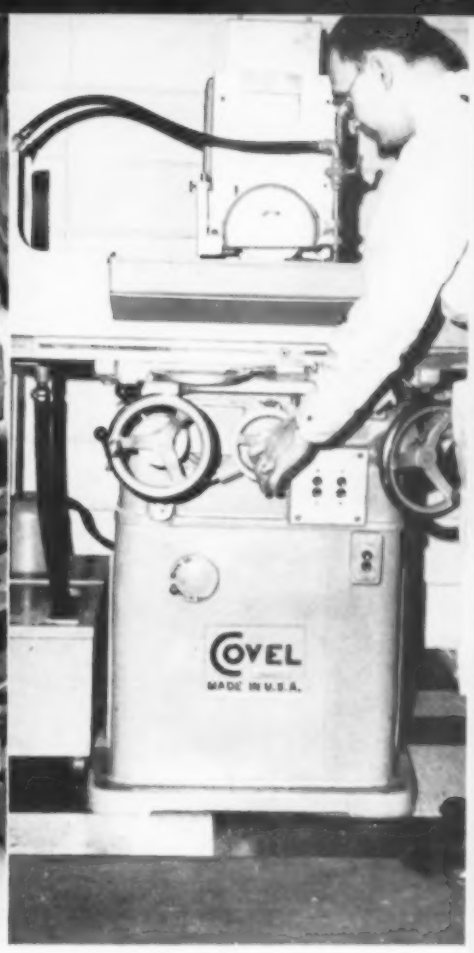
Effect of Coolant

The same tests were then made using a flowing coolant. With coolant, 75 concentration wheel provided acceptable finishes and production. These wheels also showed a projected life difference of 85-90% of the 100 concentration diamond wheel. However, the use of 75 concentration diamond wheels on large surfaces must be performed with flowing coolant,

View of the portion of the A.I.T. research department which was set up for testing various concentrations of diamond resin bonded wheels.



View of machine and set-up used in testing type D11B flaring cup wheels.



View of machine and set-up used in testing DIT wheels for periphery grinding.

where high production rate is not necessary, and where steel grade carbide is predominantly ground.

DIT Diamond Wheels

Tests were then made using Type DIT diamond wheels for periphery grinding on a Covel No. 10 surface grinder power feed with coolant facilities with a one horsepower direct motor driven spindle. These wheels were 6″ x ¼″ x 1¼″ hole, D150 N100 B⅛ and a like wheel of 75 concentration. Periphery grinding tests were conducted on cast grade carbide and steel grade carbide with the results being the same as above. There is one point favoring 75 concentration in that most periphery grinding is set up with coolant facilities available.

Die Grade Carbide

In addition to the two perviously mentioned carbides, die grade carbide was tested on the periphery set-up. Using a carbide die insert 2″ x 1″ and grinding dry the 100 concentration wheel showed acceptable production and stock removal while the 75 concentration showed poor results due to thermo-heat and slow stock removal.

50 Concentrates

On wheels such as D6WHC, many companies have used a 50 concentration resin bonded wheel for off-hand grinding and receive a good cost per tool ground. This same wheel under fixed grinding conditions should not be used. Acceptable stock removal can be obtained under these conditions with 75 or 100 concentration. In wheels of this type, the difference in the results of the various concentrations is that with 50 concentration a flowing coolant must be used to reduce thermo-heat, while 75 concentration can be used both wet and dry and produces longer wheel life and greater stock removal with coolant. 100 concentration can be used profitably dry and will offer approximately 20% longer life with coolant.

Conclusion

The 50 or 75 concentration diamond wheels can be used profitably on specific operations. The 100 concentration wheel can be used on all applications regardless of conditions. A savings, therefore, can be realized on using 75 concentration diamond if the use can designate them for a specific operation. If it is impossible to control the usage of the 50 or 75 concentration wheels, over-heated carbide, over-heated diamond wheels, which result in heat-checked diamond bonds and excessive diamond wheel wear will result.

Each diamond wheel application differs, depending on the machinery, the coolant, the grade of carbide, the rate of production desired and the size of the piece being ground. Under any laboratory conditions, only general information can be determined and therefore, it is desirable for the user to obtain information from the manufacturer on specific application for any diamond wheel concentration under 100. It is imperative that the user keep in mind that only the diamonds remove the stock and that a 100 concentration wheel contains 72 carats per cubic inch while the 75 concentration contains 54 carats per cubic inch and the 50 concentration contains only 36 carats per cubic inch.

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High strength diamond bond by new process

Tests indicate diamond tools bonded by new method are stronger, longer lasting.

This high vacuum evaporator was designed especially for use with the new bonding method.

After diamonds and steel shanks have been cleaned in an ultrasonic cleaner (background), the stone is placed into the shank prior to bonding.

Longer-lived and less expensive diamond dressing tools are now in production through the "welded-diamond" process of bonding industrial stones to steel shanks.

The bonding process takes place under an extremely high vacuum. The adhesion is so strong a whole diamond can be butt-welded to the shank.

The process provides a strong bond that allows up to 75% of the diamond to protrude; a marked jump over the limited 1/3 protrusion permitted by older bonding methods.

Vacuum Research Corp. of Queens, N.Y., is developer of the process. According to Charles G. Horn, the firm's manager of engineering, advantages of tools bonded by the new process are twofold—lower initial cost resulting from economies in the process and extended tool life through better thermal conductivity.

Tools bonded by the new process can be used by the metal, ceramic, glass, electronic, and carbide industries, Horn said.

TEST NO. 1

CONDITIONS: .25 karat tool making cuts .001″ back and forth across face of silicon carbide wheel 20″ in diameter, 4″ wide on centerless grinder.

RESULTS: Tool bonded by new process in perfect condition after 50 passes. Those bonded by conventional process broke down, after several passes popped diamonds from settings.

TEST NO. 2

CONDITIONS: Conducted without coolants.

RESULTS: Moderate sized diamonds made more than 50 cuts of .001″ while dressing a sandwich-type wheel in a centerless grinder.

TEST NO. 3

CONDITIONS: .15 karat tool

COOLANT: Water spray

RESULTS: Diamond bonded by new process remained firmly in place after 78 continuous passes. Older type tools destroyed after 45 passes.

Fig. 1. Norton type S-3, 8" x 24" surface grinder designed for table speeds up to 150 fpm.

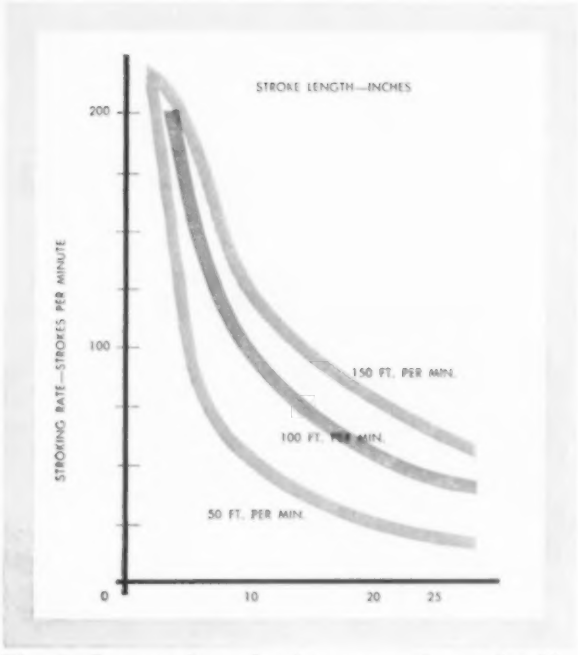


Fig. 2. Increased production comparison of table

INCREASE PRODUCTION
reduce burning with high speed table

150 fpm table on new surface grinders provides still another answer to the problem of production and burning.

• A theory was put into practice when Norton Company's Machine Tool Division introduced its line of 150 feet per minute surface grinders . . . the fastest table speeds available on reciprocating table machines. The present models of the Norton 6" and 8" hydraulic surface grinders, first shown at the Machine Tool Show last summer, operate at speeds at least 50% higher than previous models.

The theory was that higher table speeds would increase productivity and also reduce the tendency of heat sensitive steel to burn under severe grinding conditions. Extensive testing during the engineering and development phase of the redesigning project proved these advantages substantial.

The primary reason for increasing the speed of the reciprocating table was to increase the productivity of the machine. The production rate of a reciprocating table surface grinder increases with an increase in table speed in a ratio which is basically affected only by the time required for table reversal. A major consideration for the machine designer, therefore, is that of making a smooth, yet quick, reversal at each end of the stroke.

Stepping up the maximum table speed required extensive improvements in the hydraulic mechanisms of the table drive to provide a drive that would function as smoothly and reliably at a fraction of an inch per minute as at 150 feet per minute.

As shown in Fig. 2, the increased productivity of higher table speeds is most pronounced when the length of stroke is greatest. In this case, the percentage of time taken for reversal is a minimum and productivity is almost in proportion to table speed.

In tests with table speeds of 50 feet per minute, under severe grinding conditions, the depth of burn on the test piece of heat sensitive steel was .0026". When the table speed was increased to 100 feet per minute, the depth of burn under the same identical conditions except for speed, dropped to .0016".

With the increase in table speed to 150 feet per minute, the use of 6" and 8" hydraulic surface grinders as production machine tools has become increasingly practical. The precision construction which has made these machines important in toolroom operations is equally important on production lines. The increasing demand for precision manufactured parts for small and even miniaturized assemblies have made such surface grinders important tools in many new industries.

Discussions with users of hydraulic surface grinders brought out the needs for other features incorporated in the design. Increased work height capacity was required by many. Easier to use manual controls were also suggested.

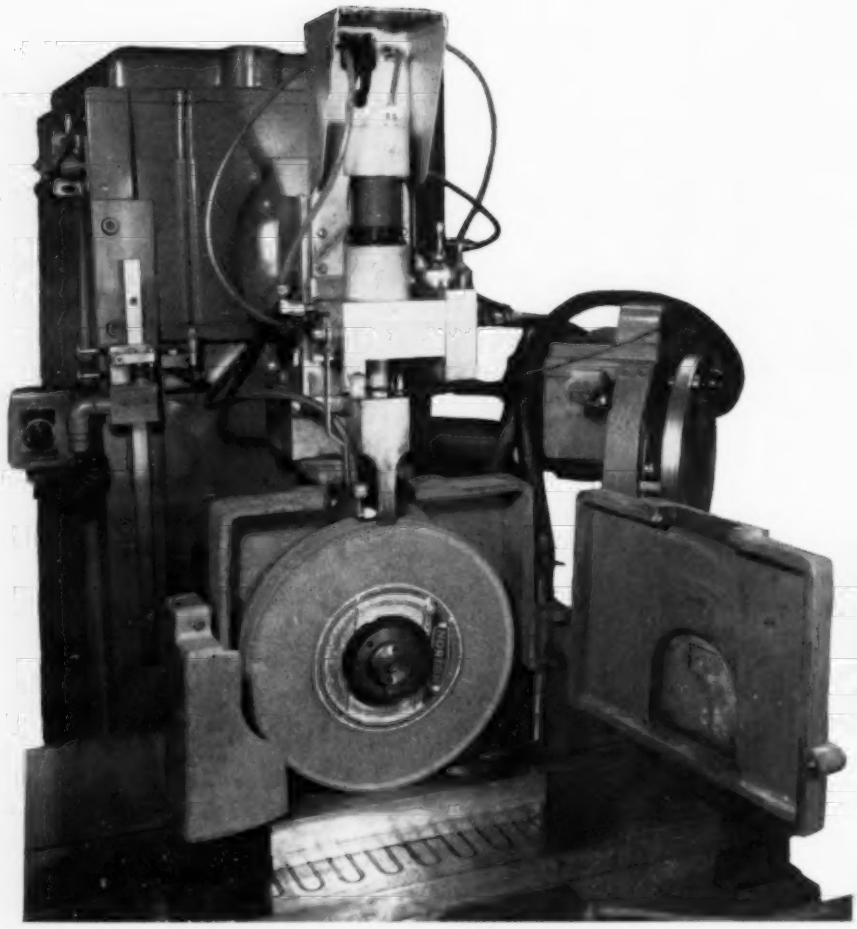
The final design was a more rugged machine built of heavier castings to maintain accuracy with increased speeds and capacity for production.

A new guide rail design improved cross feed accuracy. A wider base insures that the center of the mass of the reciprocating table and its workload is always between the cross slide ways.

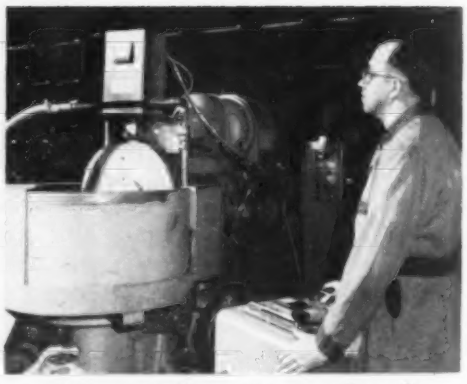
Both the 6" and 8" models can be used with a wide variety of standard auxiliary equipment which are either attachments or features built into the machine. • • •

Loading buildup - stopped

New ultrasonic attachment reduces loading build-up in surface grinding operations. Results—less dressing, extended wheel life, greater productivity, increased accuracy and finish, permits use of more efficient wheels.



In the lab of Cavitron Equipment Corp., the Landis Abrasive surface grinder is shown with attachment mounted. The transducer is located above with the aluminum head just above the wheel. Note the change of color around the periphery of the wheel caused by the action of the unit.



Arter grinding set-up used at Avco-Lycoming for ultrasonic unit test.

● In what appears to be a truly revolutionary development, a new ultrasonic attachment prevents build-up of wheel loading. The attachment, presently developed for surface grinding with wheels up to 2″, has a potential for almost all grinding methods. The unit called "Ever-Grind" was developed and is manufactured by the Cavitron Corporation, Long Island City, New York.

Basically, the equipment transmits high frequency sound waves from a transducer through an aluminum head located close to the wheel. The head surrounds the outer edge of the wheel. Water base coolant is supplied through the head to the wheel. Frequencies are in the range of 20,000 cycles per second. These vibrations of extremely short amplitude are believed to energize the coolant so as to prevent metal from building up within the grain of the wheel. The unit can be mounted similarly to a dresser with a power source or generator and controls in any convenient area near-by.

On the initial pass of the grinding wheel there is a welding of the metal chips to the grains of the wheel. The "Ever-Grind" unit does not prevent the initial build-up. The unit does stop additional build-up of material on the metal which became attached on the initial pass.

One of the companies presently testing the unit on actual production problems, is the Lycoming Division of Avco Corporation. Their results are as follows:

TEST I

Part: AMS-640 steel forging, Rockwell A-67.5 to 70.5.
Operation: Rough surface grind flange to .0005″ parallelism on Arter rotary surface grinder. Stock removal—.012″.
Wheel: A-60-J9-V, 15″ x 1½″ x 8″
Area of Contact: 1⅜″ wide x 14¾″ dia.
Wheel speed: approx. 6000 sfpm
Work speed: 2½ sfpm

Cross feed: 2″ per minute
Down feed (automatic): .0005″ per pass
Results: Reduced grinding time from 30 minutes per part to 17 minutes and reduces dressing from once every 3 parts to 11 parts (total for test) without dressing.

TEST II

Part: As above
Operation: Same as above except for finish grind
Wheel: A-60-K9-V
Results: Reduced floor to floor grinding time from 31 minutes to 17 minutes and reduced dressing time from once per part to 20 parts (total for test) without dressing.

TEST III

Part: A-286 alloy steel, Rockwell A 64.5 to 69
Operation: Surface grind flange
Wheel: A-60-K9-V, 15″ x 1½″ x 8″
Speeds and feeds: normal
Results: Production time floor to floor reduced from 14.4 minutes to 10 minutes and dressing reduced from twice per part to once per 16 parts (due to chatter—no loading or burning)

At another manufacturing company the following results were obtained.

Part: Formed steel .040″ thick
Operation: Surface grind boss to ±.001″ finish 90 rms
Area of Contact: ⅜″ x 2″
Wheel: A-60-J5-V
Results: Finish went from 120 rms to 12, chatter eliminated, 308 parts ground in less than 8 hr. on a single dressing.

In the testing lab at Cavitron Equipment Corporation, a number of tests were conducted which opened up the possibilities of this development. In one test .0475″ of brass was removed by an A-320-J8-V wheel without loading or wheel wear and obtained a finish of 2-4 rms. In another test on 303 stainless using an A-60-K8-V wheel, .337″ were removed with the "Ever-Grind" unit operating. No loading resulted or dressing was required. At this point the edges had just started to break down. Without the unit on the same piece, the wheel became loaded after removing .127″ and edges were rounded. Finish with the unit was 35 rms and without, 60 rms.

Loading is one of the major problems of bonded wheel grinding. The retarding or prevention of build-up will increase production and quality while providing savings in a great number of ways. Production is increased due to less down time for dressing and wheel change. Quality increases as finish and tolerances can be held longer without adjustment. Savings result from reduced down time, greater wheel and diamond life, reduction of wheel inventory, reduction of burning and work deformation, use of harder wheels and ability to grind difficult-to-grind material.

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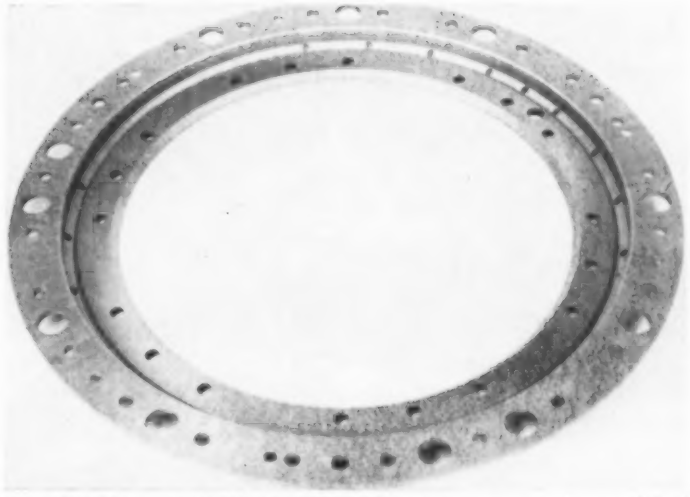
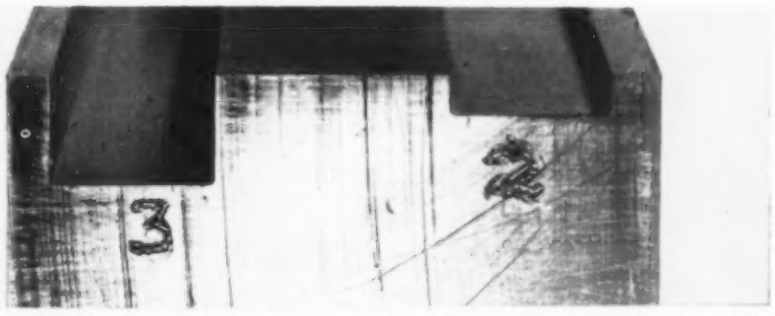
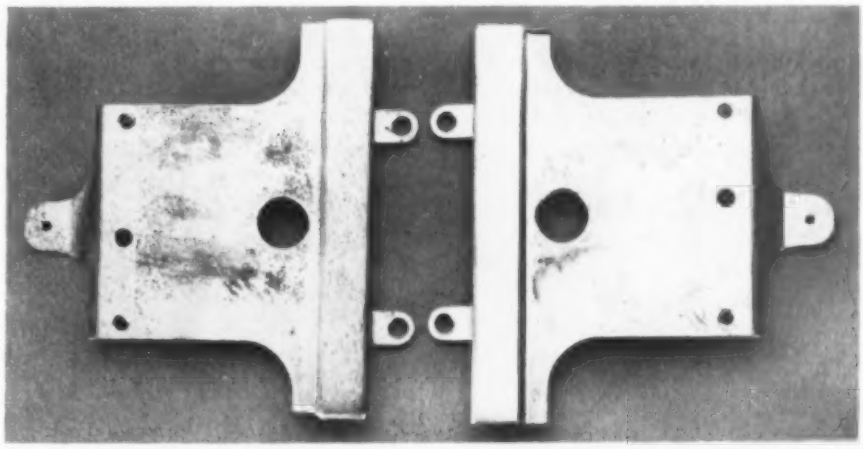


Roughing and finishing of this forging top flange was performed in half the time. Wheels required no dressing after 11 or more parts.



Shown is one piece of 303 stainless steel which has been ground on the right conventionally and on the left the "Ever-Grind." With the attachment finish went from 60 to 35 rms, wheel was still not loaded and edges held form.



Part on the left is finished conventionally. Note the better finish of the boss on the right after grinding with attachment. Parts are only .040″ thick. Chatter and loading were stopped and 10 rms finish developed.

Standard Marking System

C 36 L 5 V

What you should know about WHEEL STRUCTURE

WHEEL STRUCTURE

Dense	1	2	3	4	5	6	7	8
to								
Open	9	10	11	12	13	14	15	

By RICHARD L. McKEE Managing Editor

● Structure in a grinding wheel is the spacing of the abrasive grain to provide chip clearance. Like grade, it is a result of manufacturing materials and processes, rather than a wheel ingredient.

Like grade, also, it has been confused somewhat by the use of certain descriptive terms in other than their commonly-understood meaning.

Structure is a distinct and controllable characteristic, but it does not exist in a vacuum. It is interdependent with the other major elements of grinding wheel makeup, and must be considered in relation to the other elements in determining a given specification.

Technically, structure is determined by the volume percentage of bond and grain in a wheel as related to total wheel volume. If the resulting grain spacing is close, the structure is described as dense. If the spacing is wider, the structure is described as open.

Exceptionally wide spacing (induced porosity) describes a wheel with a temporary additive in the mix. During the firing of the wheel, this material burns out, leaving larger-than-normal air spaces in the wheel.

To put it another way, structure refers to the number and size of the air spaces that separate the cutting particles in a wheel. The wider these separations, the cooler the grinding action, since they are the "breathing spaces" between the cutting points.

Generally speaking, increasing the volume percentage of abrasive, with other factors remaining constant, results in closer grain spacing and a lower structure number. Decreasing the percentage of abrasive, of course, would result in a wider grain spacing.

Should the spacing be so wide that during curing or firing the product shrinks to change this relationship, then the grain spacing has changed, and a tighter structure wheel has resulted. In manufacturing it is known that finer grain wheels require greater pressure, but there is a limit as to how close these grains can be compressed. In other words, there are limits of pressure on one end and of shrinkage on the other.

Each structure in a given grade can be identified with established percentages of bond and abrasive. Of course, as has been emphasized before, it does not follow that one manufacturer's standards and limits for a given grade and structure will match another's.

Structure Symbol

In the standard marking system, structure is indicated by a numeral immediately following the grade letter, generally without a break. It is an optional symbol, however, and may be omitted, generally when the structure is regarded as "standard" for the bond and grade.

Following are some typical mark-

This is the fourth article of five on the standard marking system which will appear monthly until June, 1961. The first articles dealt with abrasive grain types, grain sizes, and wheel grade. The last article will discuss bond types. Reprints of the complete series will be available about July 1. Tear sheets of individual articles will be available as long as the supply lasts.

ings: (Structure symbols are in boldface type.)

WC20-**R3**-VD
A-80**L7**-V22
BA30-**F12**-V40

The "3" of the first symbol indicates a wheel in which the grain is quite closely spaced, in a recommendation for low-speed floor stand snagging. The "7" of the second symbol is for medium spacing in a suggested grading for a bench grinder. The "12" indicates a relatively wide spacing, a recommendation for surface grinding. Numbers in the range of 12 or higher usually indicate wheels with induced porosity.

Effects of Bond

A short reference to the manufacturing processes aids in understanding why certain variations are possible for one bond and not for another.

Vitrified bonds, for instance, are fired at temperatures ranging up to 2300° F. Hence, it is possible to introduce into the mix some materials which remain in the wheel while it is pressed and dried, but burn out during firing, leaving additional air spaces. This is the technique that brings about induced porosity. Firing temperature also explains why there are no steel reinforcing rings in vitrified wheels.

Resinoid and rubber wheels are cured or baked at temperatures in the range of 300°-400° F, which dictates different procedures and other materials for inducing porosity.

Relation to Grain Size

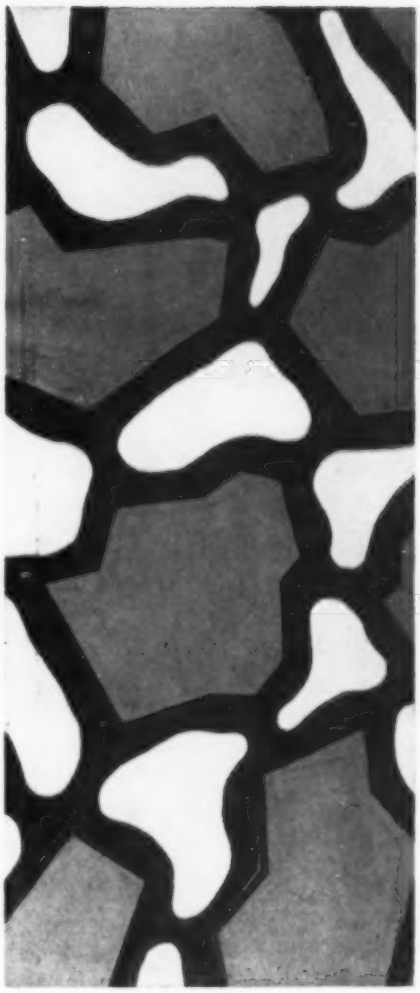
However, since structure results primarily from the volume of abrasive and bond, as related to total wheel volume, it follows that structure is not related to grain size, since the structure indicates a specific abrasive volume. Structure No. 5 indicates the same abrasive volume for 12 grit as for 220.

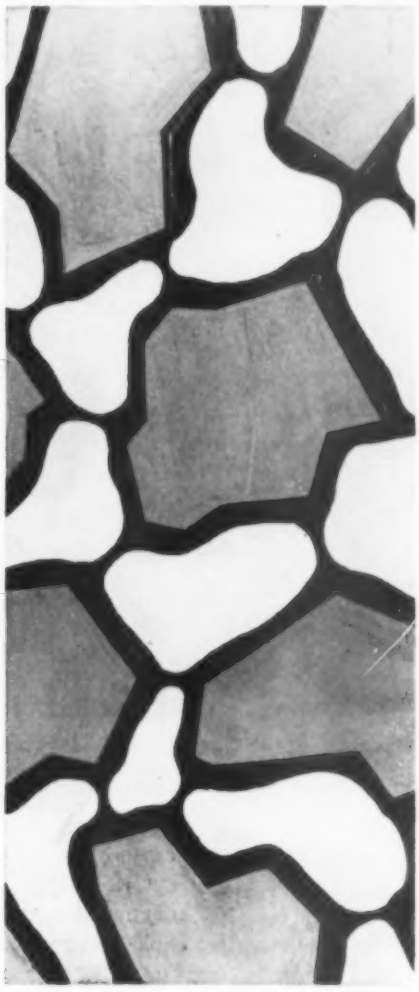
Relation to Grade

It will be recalled that grade reflected the strength of the bond posts holding grain in the wheel, and that grade was a measure of the tenacity with which the grains were retained in the wheel.

Pursuing this analogy a bit farther, it might be said that structure reflects the length of the bond posts. The longer the post, then, (or the more open the structure) the greater the chance of the grain's being torn out

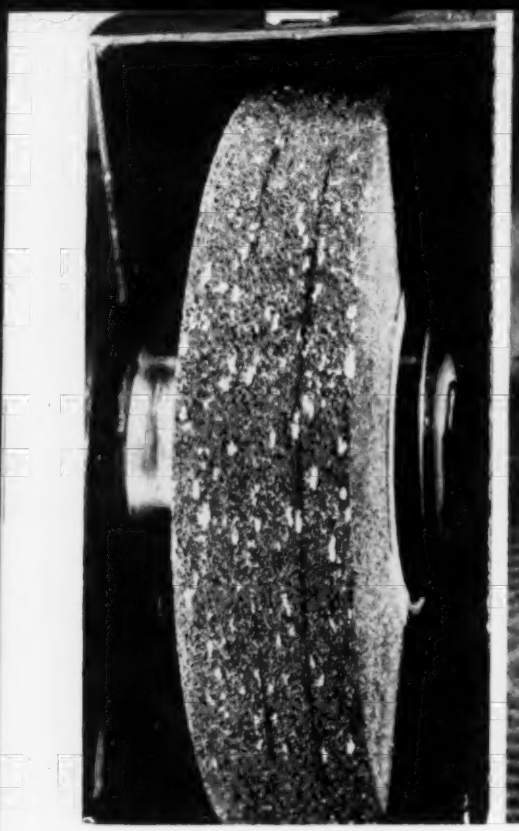
continued



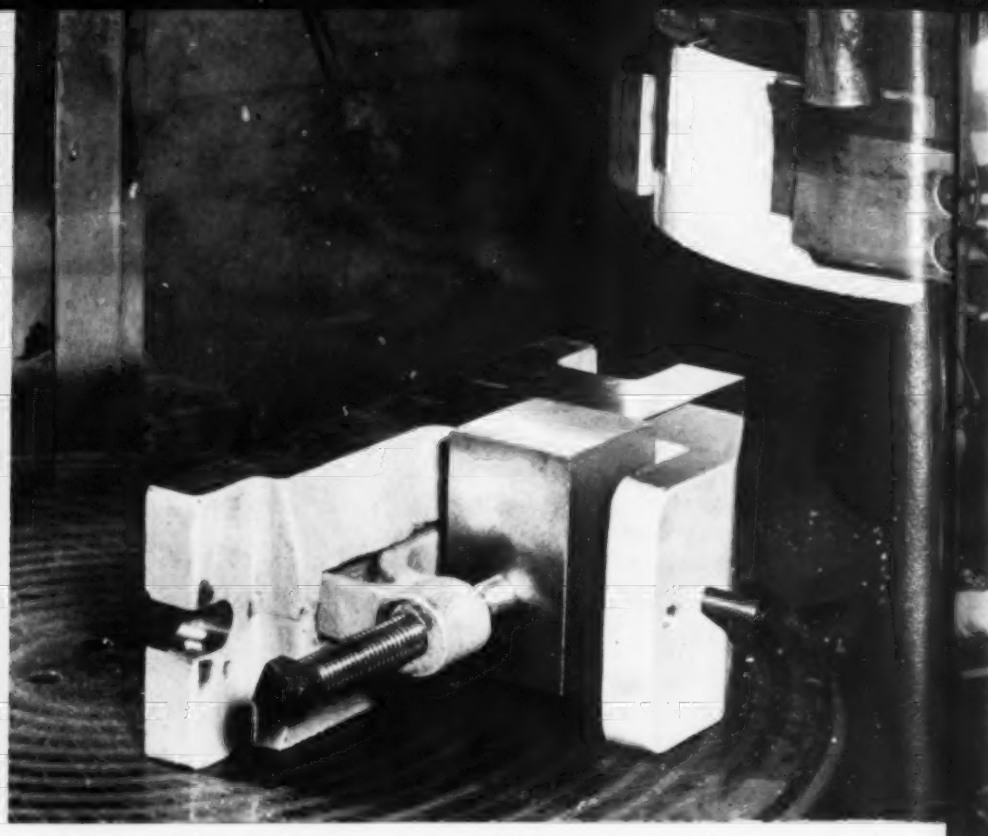


Structure is primarily grain spacing. Matched sketches showing normal (left) and open (right) wheel structure. (Photographs—Norton Co.)

Two 4A46-I-VL wheel sections, alike except for structure. Left is a normal 6 structure; right is an open 10. (Photos—Cincinnati Milling)



Face of wheel "loaded" with bits of work material. A more open structure might have prevented this condition.



The intervals between segments are an additional means of disposing of chips, though segments for surface grinding, as shown, tend to be open in structure.

of the wheel. This assumes that the posts are nominally equal in strength and the wheels, consequently, of the same grade. The grinding action could thus be described as softer in the more open wheel.

As was pointed out previously, the grade of a grinding wheel at work may, and quite frequently does, vary from its nominal grade. Wheel structure is another factor, in addition to those listed, which may cause these variations.

An examination of any list of wheel specifications would show that hard grades and dense structures tend to go together, and that similar relationships hold for medium grade and structure, as well as for soft grades and open structures. It is not an unvarying relationship, hence the need for both symbols. A soft dense wheel is quite possible, as is a hard, but open wheel.

Effect on Grinding Action

The distribution of the grinding pressure plays a large part in the effects resulting from structure differences. Each grain at the grinding surface carries a lighter load in wheels with closer grain spacing. The wheel manufacturer compensates for this by using a lower bond volume for closer structures in a given grade.

In any given grade a manufacturer can provide various structures for a particular operation. Say that a typical cylindrical operation could be performed with either an A60-L8V or A60-L5V, both of the same grade.

One of these might perform more efficiently than the other, not because it is harder or softer by physical tests, but because the grain spacing is better suited to the operation. An operator might feel that one of the wheels acts harder than the other, when in truth it is a difference in action resulting partly from the difference in the number of grains at the surface.

Structure has several other important effects on the grinding action of wheels. For instance, if the grains are widely spaced, the wheel has a cool cutting action. If the grains are too closely spaced for the application—and particularly true on soft materials—particles of the work material may be retained in the wheel face, loading it and reducing its cutting efficiency.

Wheel loading can be reduced or eliminated, of course, by other means than grain spacing. The coolant, in wet grinding, tends to retard pick-up of work material. In dry grinding, coating the wheel face with stick tallow or similar material, or impregnating the wheel with some appropriate substance helps to achieve the same purpose.

Chips can be disposed of by other means than the spacing between grains. The perforations which are often molded into discs illustrate one alternate method. The spaces between segments for surface grinding show another. In both cases, something other than the natural combination of grain, bond, and air space provides a means of removing the chips from grinding.

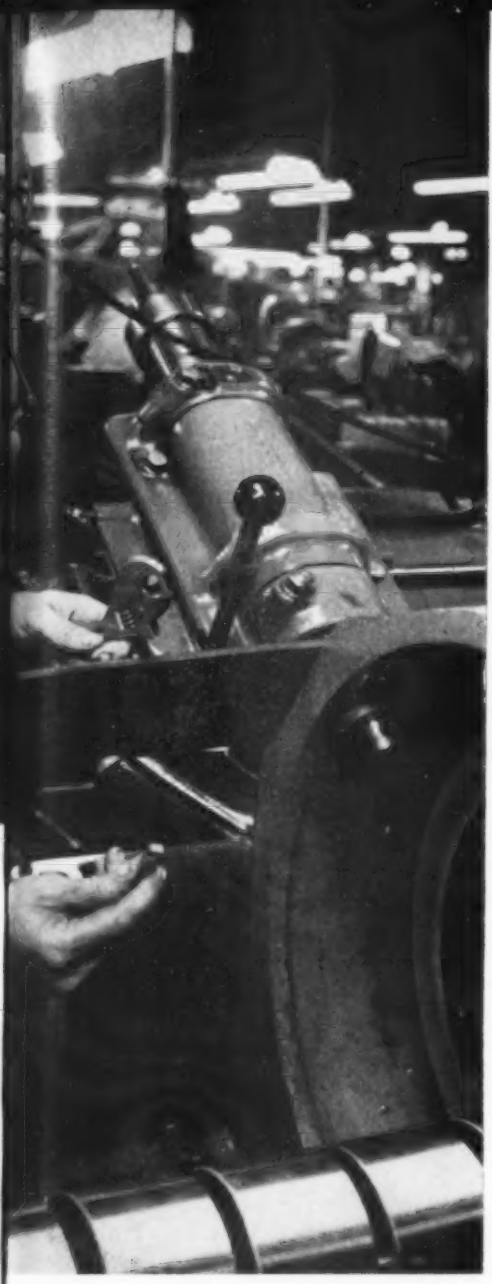
The determination of the best structure for an application is a technical matter preferably left to the manufacturer. There are, however, ranges of structure numbers that have been proved superior for various types of applications.

For line contact grinding, cylindrical for example, low structure numbers indicating close grain spacing are superior. Where the area of contact is broad, as in surface grinding, high structure numbers with side grain spacing are indicated. Area of contact between wheel and work is a significant factor in the determination.

• • •

Match dresser, grinding wheel for best results

Diamond dressing tool study shows better results from adjusting size of diamond in tool to grit size in abrasive wheel. Wide variety of finishes and materials precludes an all-purpose dressing tool.



Operator examines a diamond impregnated dressing tool before installing it on a centerless grinder. The tool, tipped with small particles of natural diamond in a sintered metal bond, does not have to be rotated during its life.

● Recent tests of diamond dressing tools have confirmed a long-standing Chicago Screw Company practice of matching the size of the diamonds in dressing tools to the grit, grade and bond of the grinding wheel. Chicago Screw is a division of Standard Screw Company.

Results of the study show that better quality finishes are produced when the selection of the diamond dressing tool is given the same care as the choice of the abrasive wheel, the speed and feed of grinding, and the type and rate of flow of the coolant.

Chicago Screw uses all types of diamond dressing tools—single point, multiple point, cluster, and diamond impregnated. The wide variety of materials ground and the broad range of micro-finishes required have eliminated the idea of an all-purpose dressing tool.

Their production department considers the keying of the diamond dressing tool to the grinding wheel an important requirement for successful grinding.

This most recent test program was initiated to test the effectiveness of varying the diamond size in impregnated dressing tools for wheels grinding a full range of microfinishes.

Impregnated dressing tools—one brand marketed under the name Tru-Grit—had been very successful in dressing wheels for grinding metals to a 6-10 rms finish. Keying the size and concentration of the diamond particles to the grain size, bond, and hardness of the abrasive wheel, it was found, reduces the possibility of opening the grinding face of the wheels too much for precision finishes.

At the same time, the diamond grit clears the surface of the wheel enough to prevent glazing or burning of the workpiece. The Tru-Grit tool presents many small diamonds to the wheel surface, substituting a smooth dressing action for the abrupt shearing action of the single-point tool.

So far, production supervisors at Chicago Screw have found that wheels dressed with impregnated diamond tools give substantially more production between dressings than those dressed with conventional tools.

Dressing time has been cut in half, and the cost is considerably less with impregnated tools.

Better quality finishes achieved through careful keying of dressing tools and grinding wheels have resulted in longer life for the finished parts. Two reasons are given:

1. The grinding wheel operates at optimum efficiency.
2. The wheel face is more consistent, producing parts free from surface blemishes. Blemishes tend to concentrate stress at certain points, inducing premature failure.

A typical example of this dressing operation is the finishing of a bearing recess sleeve on a centerless grinder. The wheel is 20″ x 8″ x 12″ 60 grit vitrified aluminum oxide, L grade 5 structure.

The recess sleeve must be ground to a diameter of 3.752″, minus zero, plus 0.001″. Surface finish required is 11 to 16 microfinishes. Wheel speed is 1250 rpm. About .002″ stock is removed during grinding.

The wheel face is dressed by a permanently mounted impregnated diamond tool after approximately 300 pieces are ground. Time for dressing and adjustment is about 3 minutes, during which the tool passes twice across the wheel face.

For this application, the impregnated diamond tool does not have to be rotated during the life of the tool.

New diamond particles are constantly exposed in the dressing tool, insuring a clean, smooth dressing job at each pass of the tool. • • •

ABRASIVE MACHINING EQUIPMENT
on exhibit at ASTME show

Here's a brief preview of the abrasive machining supplies and equipment to be displayed May 22-26 in New York City.

More than 6,000 machines, machine tools, and related products are to be displayed at the 1961 Machinery Tool Exposition at the New York City Coliseum May 22-26.

The Tool Exposition, one of the nation's largest exhibits of creative manufacturing equipment, will run concurrently with the 1961 convention of the American Society of Tool and Manufacturing Engineers.

The Society will also hold its 29th annual Engineering Conference at the Statler Hilton Hotel. In addition to various plant tours, technical tours, and a public affairs panel, 50 technical papers are to be presented.

The more than 6,000 items on display will cover almost every conceivable type of manufacturing equipment.

More than 90 national companies whose activities relate to the abrasives industry will be represented at the Exposition.

Here are just a few of the items these firms will be displaying:

ANTARES INSTRUMENT INC.

(BOOTH NO. 3938)

Equipped with helical and radial grinding attachments, the latest design of Kuhlmann Cutter and Tool Grinder—Model FSM—will handle the resharpening and restoration of practically all types of cutters and tools.

Antares is also displaying the KSM Bench Type Precision Grinder for sharpening high speed steel and carbide tools up to 2" diameter.

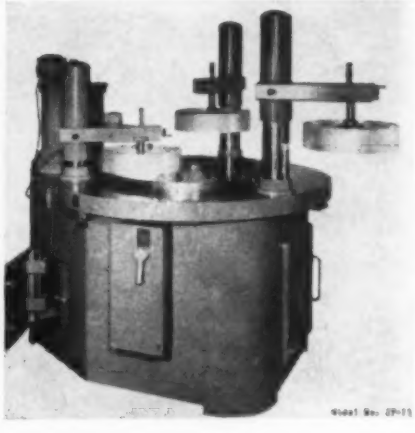
Antares Instruments Inc., 55-02 37th Ave., Woodside 77, N.Y.

AMERICAN MACHINE AND FOUNDRY COMPANY

(BOOTH NO. 3515)

The AMF keyless chucks have four hardened and ground jaws which automatically center the tool and provide a tight grip. The AMF Vise assures positive anchoring to the drill press table and locks in any position.

American Machine and Foundry Co., AMF Building, 261 Madison Avenue, New York 16, N.Y.



SPITFIRE TOOL AND MACHINE COMPANY

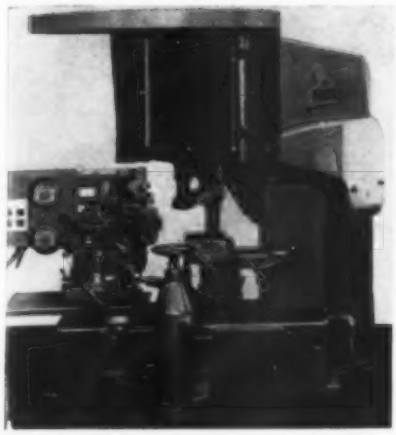
(BOOTH NO. 1529)

Model No. SP-F888-36PN Spitfire 36" Gyro-Matic Precision Flat Lapping Machine completely lacks awkward holding devices or magnets. It features pneumatic lifts which automatically apply correct pressure for lapping a wide variety of materials.

Spitfire Tool and Machine Co., 2931 N. Pulaski Road, Chicago 41, Illinois.

Alphabetical listing of ASTME exhibitors and booth numbers

A. A. Gage Co.	2518	Buck Tool Co.	1222	Eastern Machine & Tool	3907
Aaron Machinery Co.	1615	Cincinnati Mill Machine Co.		Enco Mfg. Co.	3834
Aget Mfg. Co.	3922	Meta-Dynamics Div.	1614	Englehard Hanovia	2650
Airetool Mfg. Co., The	1441	Cincinnati Sub-Zero Products	2002	General Electric Co.	3242
Alameda Gage Co.	3518	Cleveland Instrument Co.	1428	Gisholt Machine Co.	2537
American Mach. & Fndry.	3515	Collins Microflat	3226	Gleason Works	3717
American Sip Corp.	2246	Columbia International Co.	1308	Green Instrument Co.	2636
Austin Industrial Corp.	1205	Crafts Co., Inc., A. A.	3225	Gulf Oil Corp.	2433
Bachmann Co., Inc., E. R.	2202	Crystal Lake Machine		Hamilton Watch Co.	3212
Beaver Pipe Tools	3822	Works, Inc.	3409	Hammond Machinery Builders	2217
Bellows Valvair Corp.	2517	Diamond Tool Research Co.	3310	Harig Mfg. Corp.	1514
Bendix Corp., The	1414-1428	DoAll Co.	2222	Harnischfeger Corp.	1429
Boggis Co., Henry P.	2642	Doeden Tool Corp.	2016	Hermes Machine Tool	1114
Boyar-Schultz Corp.	2009	Dorsey Gage Co.	3814	Homestrand Machine Tool	3402
Bridgeport Machine, Inc.	1215	Dumore Co.	2428	J & S Tool Co., Inc.	3835
Brown & Sharpe Mfg.	1315	Easco Products, Inc.	1624	Lassy Tool Co.	1728



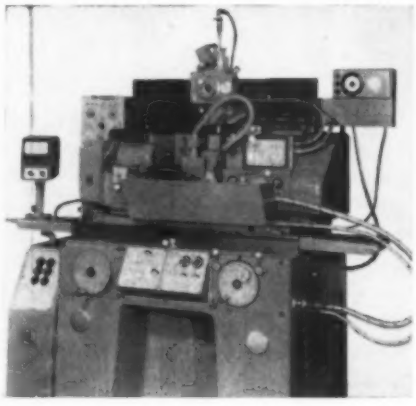
ERIC R. BACHMANN COMPANY, INC.

(BOOTH NO. 2202)

The automatic longitudinal and/or cross travel of the Loewe Optical Profile Grinder, Model SP, permits fully automatic grinding of flat faces and accurate grinding of irregular profiles.

The Herminghausen High Precision Centerless Grinder, Model SR-1, is equipped with a 12" grinding wheel and an 8" regulating wheel. Spindles of both wheels are mounted in preloaded adjustable super-precision ball bearings.

Eric R. Bachmann Co., Inc., 27-11 41st Ave., Long Island City 1, N.Y.



AUSTIN INDUSTRIAL CORPORATION

(BOOTH NO. 1205)

The MSO Cylindrical Grinder Model FH-100 has been designed for production of ultra-precision parts. Its capacity is 3½" x 12".

Also in the Austin display will be the MSO Production Grinder, Model FH-200/750; the MSO Universal Grinder, Model FMES; and the MSO Optical Coordinate Jig Borer, Model PFRL.

Austin Industrial Corp., 76 Mamaroneck Avenue, P.O. Box 430, White Plains, N.Y.

LASSY TOOL COMPANY

(BOOTH NO. 1728)

Lassy's complete new line of gang vises and gang fixtures will be exhibited, including one which features a new compensation jaw assembly that assures even, powerful pressure on a number of pieces though they vary in size.

Lassy Tool Co., Plainville, Conn.

DOW MECHANICAL CORPORATION

(BOOTH NO. 3507)

Dow Flush Pin Gages, many for tolerances as low as ±.0002, are designed to check true hole positions in relation to given surfaces. Checking speeds can reach the rate of 400 per hour.

Dow Mechanical Corp., Thompsonville, Conn.

DOEDEN TOOL CORPORATION

(BOOTH NO. 2016)

The new Dotco Pneumatic Hole Grinders can be used either vertically or horizontally by insertion into a honing head on mills, lathes, or boxers. The set-up is similar to other offset boring work.

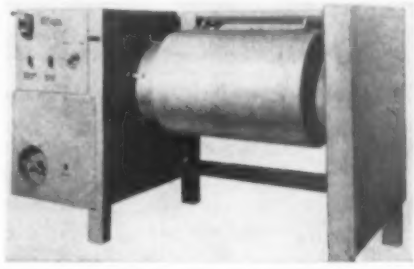
Doeden Tool Corp., Hicksville, O.

DORSEY GAGE CO., INC.

(BOOTH NO. 3814)

Among the new items on display at the Dorsey exhibit are: the dial pin gage and master for checking large control diameters or bores or recesses; an easy-to-set scribe gage; large diameter or shallow hole gages; a dial groove gage; a dial bore gage; and a versatile test gage which can be used both as a measuring instrument and a comparator.

Dorsey Gage Co., Inc., W. Dorsey Lane, Hyde Park, N.Y.



MINNESOTA MINING AND MANUFACTURING COMPANY

(BOOTH NO. 3701)

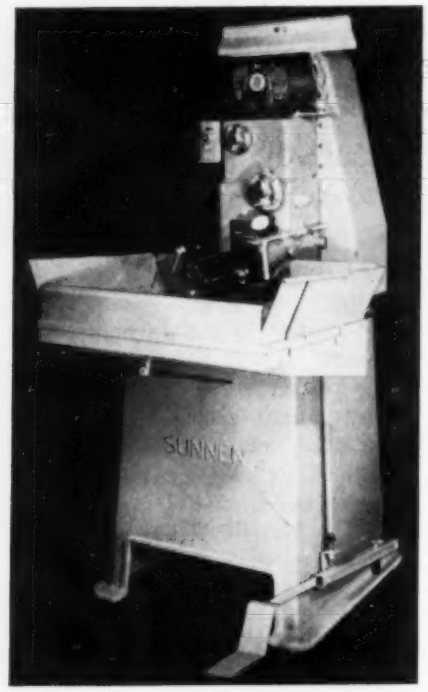
Automatic control of tumbling cycle, automatic separation and media retention, and automatic discharge of finished parts are features of the Honite automated barrel, designed to minimize hand labor in batch drying and polishing metal parts.

Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.

continued

M & M Tool & Mfg. Co.	2632	Pratt & Whitney	2529	Stewart-Warner Corp.	3917
Mahr Gage Co.	2209	Producto Machine Co.	2450	Sun Oil Co.	3306
Master Chemical	1226	R-O Mfg. Co.	1025	Sunnen Products Co.	1515
Metal Products Div.-G. E.	2118	Riggs Co., Wm. L.	1345	Taper Micrometer	3230
Metal Removal Co.	1137	S & S Machinery Co.	2446	Texaco, Inc.	3146
Micrometrical Mfg.	3617	Sanford Mfg. Corp.	3829	Torit Mfg. Co.	3810
Minnesota Mining & Mfg. Co.	3701	Scherr-Tumico Co.	2138	U. S. Tool Co.	2250
Mobil Oil Co.	3418	Sheffield Corp., The	1414	Ultrasonic Precision Co.	2234
Montgomery & Co.	1223	Simonds Abrasive Co.	3818	Van Keuren Co.	3218
Oakite Products, Inc.	3602	Simpson Optical Mfg. Co.	1104	Visual Inspection Products Co.	3236
Opto Metric Tools	2201	Skilcraft Corp.	3239	Vulcan Tool Co.	1550
Osborn Mfg. Co.	2407	South Bend Lathe, Inc.	1138	Walker Co., O. S.	2418
Permattach Diamond Tool Corp.	2107	Spitfire Tool & Machine	1529	Wheelabrator Corp.	1502
Portage Double Quick Co., Inc.	2622	Stanley Electric Tools, Div. Stanley Works	3830	Wilson Co., Thomas C.	1218
		Starrett Co., L. S.	1214	Wilton Tool Mfg.	3838
				Winslow Prod. Engineering	1240

ASTME Show cont'd. . . .



SUNNEN PRODUCTS COMPANY (BOOTH NO. 1515)

The Sunnen exhibit will feature its new, versatile honing machine which has a wide range of spindle speeds and a double reduction belt drive that delivers full power from a ½ h.p. motor to the spindle at all operating speeds. The machine can handle any honing applications on a .100" to 2.625" bores with standard tooling.

Sunnen Products Co., 7910 Manchester Ave., St. Louis 17, Mo.

O. S. WALKER COMPANY (BOOTH NO. 2418)

A new low-frequency demagnetizer works on the principle of subjecting the workpiece to a very strong magnetic field. This and other features permit full penetration of the demagnetizing field into the workpiece.

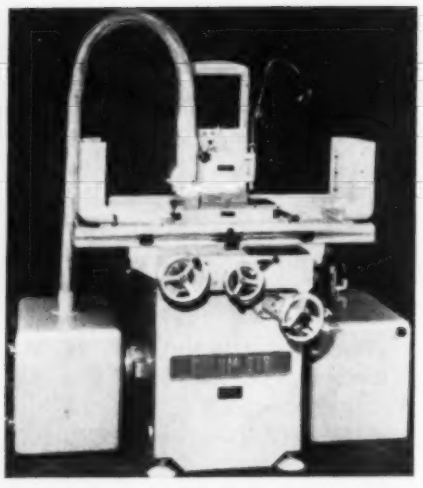
Also on exhibit will be the Electroperm Chuck that eliminates problems caused by heat generation when holding large, ferrous workpieces.

O. S. Walker Co., Worcester, Mass.

MASTER CHEMICAL CORPORATION (BOOTH NO. 1226)

Master Chemical will be exhibiting its line of TRIM all-chemical coolants and cutting fluids.

Master Chemical Corp., 13 N. Huron St., P.O. Box 857, Toledo 1, O.



HERMES MACHINE TOOL CO. (BOOTH NO. 1114)

The Blohm Model 816 hand operated surface grinder capacity 8"x16", features a table on ball bearing assemblies running in hardened ground and replaceable steel ways. The high precision ball bearing spindle is directly driven by a 2 h.p. motor.

Hermes Machine Tool Co., 48-15 Northern Blvd., Long Island City 1, New York.

CLEVELAND INSTRUMENT COMPANY (BOOTH NO. 1428)

Designed to accurately determine the thickness of transistor wafer or dice, the Cleveland Par-Ac Electronic Transistor Wafer Gage can check upward of 500 parts per hour for segregation into the required size categories.

Cleveland's Polar Recorder, designed for use with the Cleveland Ex-Ac, measures the roundness, concentricity, and squareness characteristics of a part within the accuracy of the machine spindle.

Cleveland Instrument Co., 6220 E. Schaff Road, Cleveland 31, Ohio.

THE SHEFFIELD CORPORATION (BOOTH NO. 1414)

The Sheffield Ferranti FI-22 Measuring Machine is used for fast, precise measuring of the location of holes and surfaces of parts in two dimensions. It displays the X and Y coordinate readings simultaneously by means of lighted numerals on the panel above the gage table. Gaging accuracy obtained on the 15-24-inch range is better than .001".

The Sheffield Corp., Dayton 1, O.

DUNHAM TOOL COMPANY (BOOTH NO. 2610)

The Dunham "Vacuum Plate" holds glass, wood, steel, aluminum, and other materials for machining and grinding operations. They may be tooled and stored for repeat jobs, incorporated into automated devices, and mounted on machine tool tables and on magnetic chucks.

Dunham Tool Co., Inc., New Fairfield, Conn.

WINSLOW PRODUCT ENGINEERING CORPORATION (BOOTH NO. 1240)

Latest accessory for the Model 100-A Winslo-Matic Drill pointer is a new workhead for grinding chamfers on taps. The angle of chamfer grind is determined by the angle formed on the grinding wheel. The operator can produce tapped holes to Claff 5 precision.

Winslow Product Engineering Corp., 47 St. Joseph St., Arcadia, California.

L. S. STARRETT COMPANY

(BOOTH NO. 1214)

Starrett will exhibit a variety of new tools including: a master vernier height gage featuring a long 50-division vernier with widely spaced graduations; half base micrometer depth gages designed to facilitate measuring depths of holes and slots located close to shoulders or between obstructions; the No. 25-106 Dial-Master for applications requiring extreme precision.

L. S. Starrett Co., Athol, Mass.

HUDSON AUTOMATIC MACHINE AND TOOL CO.

(BOOTH NO. 3401)

The Doebeli Carbide Tool Grinder is for grinding and lapping cutting tools. Also to be displayed is the Projectina projector-microscope-comparator, with Polaroid photo attachment, for metallurgical inspection, and the Micro-VU Optical Comparator for small parts inspection.

Hudson Automatic Machine & Tool Co., 137-138 38th Street, Union City, New Jersey.

OSBORN MANUFACTURING COMPANY

(BOOTH NO. 2407)

The 5224-M1A Finishing Machine, a new unit for high production deburring, edge blending, surface cleaning, polishing, and buffing applications, consists of two spindle indexing work holders, and one universal finishing wheel head. Major setup adjustments are built in to achieve any compound angle for positioning of the finishing wheel.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

FINISHING MILL SUITED FOR FRAGILE PARTS

The gentle spiral orbital movement of Southwestern Engineering Company's new SWECO vibro-energy finishing mill is particularly suited for processing fragile parts, including ceramics and plastics.

The unit incorporates three-dimensional, high frequency vibration. The spiral orbital movement of the parts through the media and compound provides the vibrating and sliding actions associated with barrel finishing.

Design simplicity permits use of lower horsepower motors and minimum maintenance. Simplicity is also responsible for the compactness of the unit which requires only the floor space dictated by container size.

Only one adjustment is required for decreasing or increasing the motion of the parts throughout the mass. Motion of the media and mass permits fast unloading through a quick-opening discharge door.

A specially-formulated polyurethane lining creates highly effective abrasion-resistant characteristics. The mill operates with a sufficient quantity of water additive for burnishing operations.

The open-top design provides fixturing flexibility, and a protective fabric cover can be placed over the top of the bowl when corrosive compounds are used.

The unit transmits no vibration, operates quietly, and employs no gears, belts, vari-speed drives, jackshafts, or couplings.

Southwestern Engineering Co., Vibro-Equipment Division, 4800 Santa Fe Ave., Los Angeles 58, Calif.

Compactness of SWECO's new finishing mills permits minimum use of floor space.

The non-violent orbital action of media and parts allows an open-top design which permits easy checking of the finishing process.

GREEN WHEEL GRINDS CARBIDE FAST

By Ray Horne

• Rough-grinding large spalled areas out of carbide tools can be a tedious and expensive operation. In our shop this had always been done wet on a tool grinder equipped with a 14 x 4 x 11 Type 2 cylinder wheel, 60 grit vitrified, semi-friable combination of black and green silicon carbide, K grade, open (15) structure, with the tool held by hand on the work rest.

Following up a feeling that this roughing ought to be done faster, we tried it on a Sellers "jumping-jack" (Model 6T) tool grinder, using a 60 grit vitrified green silicon carbide wheel in a softer (H) and less open (11) specification.

This grinder uses a 24 x 2¾ x 10½ Type 1 wheel with an "E" face, and operates at 850 rpm. To guard against cracking, we flooded the work with coolant.

With this new method we can grind approximately a cubic inch of material off a carbide tool in a couple of minutes without heating or cracking the tool. Mill-brazed tools and inserts in steel holders cause no problem. The wheel grinds steel along with the carbide. And the wheel is soft enough to be self-dressing.

Whatever work-holders are needed are either standard, or can easily be fabricated.

After tools have been ground for a period on one side of the beveled face, the wheel is reversed on the spindle to equalize wear.

Roughing a carbide tool with a green silicon carbide grinding wheel. The spindle oscillates as the wheel revolves. Coolant flow restricted for photograph. (Photo—International Harvester).

TRANSPARENT TAPE BINDS, PROTECTS GAGE BLOCKS

By H. J. Gerber

• When a stack of gage blocks is to be used during the day for frequent re-checking of instruments and gages, it is often helpful to wrap the stack with transparent pressure-sensitive tape.

The tape serves several purposes. It prevents accidental separation of the blocks. While the blocks are being handled, it is also a protection against damage from skin acid corrosion.

Leaving blocks wrung together over night is not recommended. We usually separate them and re-oil them for storage at the end of each work day.

MAKING HOLES IN GLASS

• Use a piece of copper tubing of the same outside diameter as the hole to be made in glass or pottery. Fix it in a hand drill. Use a block or other jig to be sure to hold the drill.

Apply Clover Compound to the end of the tubing and turn slowly. The compound will cut faster if the end of the tube is notched to carry the compound.

Raise the drill occasionally to insure that the compound is settling in the groove.

If a power drill is employed, use a very light pressure and slowest possible speed. • • •

(Courtesy Clover Manufacturing Co.)

Informative reading in abrasive operations for management, engineering, production.

Grinder Control System

Use postpaid card. Circle No. 1

Ten-page booklet describes installation and operation of the Bellow-Airborne infeed grinder control system. Explains application of the system and its various uses. Bellows-Valvair, Akron 9, Ohio.

Comparator, Measuring Machine

Use postpaid card. Circle No. 2

Six-page folder describes Models FC-14 and TC-14 optical comparator and measuring machine manufactured by Jones & Lamson. Discusses features, uses, attachments, and applications. Jones and Lamson Machine Co., Springfield, Vt.

Mounted Wheels

Use postpaid card. Circle No. 3

Thirty-page illustrated catalog simplifies customer specifications and ordering methods for Bay State mounted wheels. More than 10 million combinations of grit, size, bond, porosity, spindle size, and other features are possible to meet customer problems. Catalog lists stock availability. Bay State Abrasive Products Co., Westboro, Mass.

Dual Purpose Grinder

Use postpaid card. Circle No. 4

A dual purpose grinder that can be arranged as a plain cylindrical grinder or as an internal grinder by changing wheelheads is the subject of a 4-page folder. Discusses general construction, wheelhead, operation, feeds, and attachments. Sunstrand Machine Tool, Belvidere, Illinois.

Surface Grinders

Use postpaid card. Circle No. 5

Bulletin GL-5-57 covers Gallmeyer and Livingston's Grand Rapids surface grinders. Describes models, uses, applications, equipment, and operation. 18 pages. Gallmeyer and Livingston Co., Grand Rapids, Mich.

Polishing and Buffing

Use postpaid card. Circle No. 6

Five catalog sheets offer specifications on 5 different types of automatic polishing and buffing machines. Includes complete specifications and information on work capacities, production rates, buff heads, wheels, head adjustment, motors, controls, work tables, and available accessories. Packer Machine Co., 456 Center St., Meriden, Connecticut.

Contact Rolls

Use postpaid card. Circle No. 7

"Contact Wheels and Rolls," a 6-page folder discusses the engineering principles behind the operation of contact rolls. Also discusses theory, selection, ordering and use of contact wheels. Dept. BMD, Carborundum Co., P.O. Box 337, Niagara Falls, N.Y.

Air Gages

Use postpaid card. Circle No. 8

Catalog 615 lists and describes various Taft-Peirce air gages. Includes descriptions and applications of each unit. Discusses operation and various accessory items. Sixteen pages. Taft-Peirce Mfg. Co., 32 Mechanic Avenue, Woonsocket, Rhode Island.

Coated Abrasives

Use postpaid card. Circle No. 9

Various types of sanding discs and their suggested uses are discussed and tabled in a 4-page brochure. Bates Abrasive Products Inc., 1129 East 74th Street, Chicago 19, Illinois.

Pneumatic Equipment

Use postpaid card. Circle No. 10

Bulletin 70 presents 29 models of Airetool pneumatic grinders, sanders, drills, reamers, screwdrivers, nut runners, filing tools, and cutting tools. Applications and uses of various tools and their accessories are briefly explained. Airetool Mfg. Co., Springfield, Ohio.

Crown-Gear Grinder

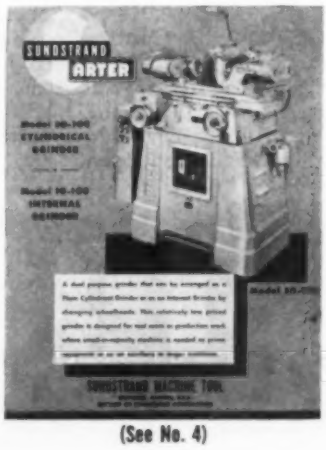
Use postpaid card. Circle No. 11

Technical data sheet gives complete specifications and describes operations of Model CGG-16x18FA fully automatic crown gear grinder. Includes details on various cycles of rough, semi-finish, and finish grinding, rates of feed, wheel dressing, and compensation for wheel wear. Gear Grinding Division, Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Mich.

Grinding Machines

Use postpaid card. Circle No. 12

Catalog TG-1, a 12-page booklet, lists various K. O. Lee grinders, attachments, fixtures, arbors, adapters, and accessories. The abilities and applications of the units are described and available optional equipment is listed. K. O. Lee Co., Aberdeen, S.C.



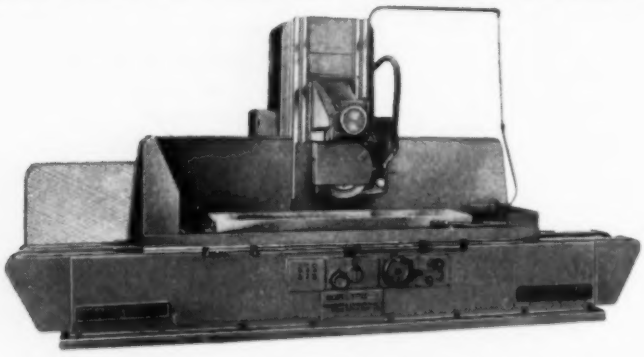
(See No. 4)

(See No. 8)

(See No. 12)

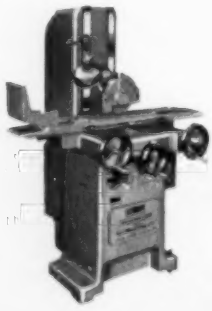
FOR

MAXIMUM PRECISION IN TOOLROOM OR PRODUCTION GRINDING



MODEL F HYDRAULIC FEED SURFACE GRINDER a production type with cross sliding head, built in sizes ranging from 12" x 18" x 48" to 30" x 25" x 120". Heavy, powerful grinder with maximum table speed of 150' per minute. Motor mounted directly on grinding wheel spindle to assure full power is transmitted directly to wheel. Automatic feeds in increments from .0001" to .001" per reversal available.

NO. 10 UNIVERSAL CUTTER AND TOOL GRINDER built to meet the need for a high grade machine of medium capacity at a moderate price. Combines rigidity with maximum convenience of operation. Head swivels 360°, locks in any setting; table swivels 90°. Hand operated longitudinal movement. Two spindle speeds.



NO. 20 HAND FEED SURFACE GRINDER has hand wheels for vertical and longitudinal table movement to assure toolroom precision and exceptionally fine finish. One-piece column and base, greased-for-life ball bearing spindle. Available with portable, motor driven coolant system.

FREE LITERATURE *continued*

Diamond Tools

Use postpaid card. Circle No. 13

Catalog 65 presents J. K. Smit diamond wheels, saws, and hones. Tools are identified by dimension type, depth of diamond section, and concentration. Includes explanation of diamond wheels marking system and an analysis of type designations. J. K. Smit and Sons, Murray Hill, New Jersey.

Belt Grinder

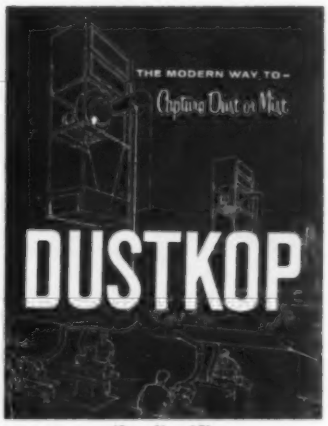
Use postpaid card. Circle No. 14

Four-page brochure describes uses, application, and versatility of the new Kar-Ry Precision belt grinder. Illustrates various work abilities and depicts some of the shapes the unit is capable of finishing. Industrial Machines and Services Co., P.O. Box 995, New Britain, Conn.

Dust Collectors

Use postpaid card. Circle No. 15

Bulletin 700 from Aget Mfg. Co. lists various series of Dustkop dust collectors. Describes capacities of various collectors and indicates operations for which they are best suited. Aget Mfg. Co., 1408 East Church Street, Adrian, Mich.



(See No. 15)

Flared Cups

Use postpaid card. Circle No. 16

Bulletin M1451, a 2-page catalog sheet, describes features of Manhattan safety back flared cups. Provides availability, specifications, and prices. Abrasive Wheel Dept., Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N.J.

GRAND RAPIDS

Mounted Wheel Safety

Use postpaid card. Circle No. 17

Thirty-six page booklet covers the principles of safe and efficient operation of mounted grinding wheels. Includes tables of maximum operating speeds and explains principles on which maximum speeds are based. Details and charts of standard sizes of mandrels and wheel shapes are provided, and shape and mandrel sizes for each group of standard shapes are tabulated. The Grinding Wheel Institute, Cleveland, Ohio.

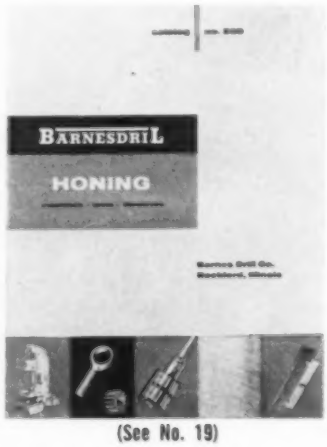
Barrel Finishing

Use postpaid card. Circle No. 18

Barrel finishing machines and methods featuring ALMCO barrels are the subjects of a 4-page folder. Describes two models and available equipment. Also lists various finishing materials with brief descriptions of their applications. ALMCO, Queen Products Division, King-Seeley Corp., Albert Lea, Minn.

Honing

Use postpaid card. Circle No. 19

Catalog 200 describes development and type of honing methods and the honing process. Reciprocation and rotation rpm of spindle speeds are tabulated. Describes and illustrates Barnesdrill honing machinery and includes a basic honing coolant chart. Sixteen pages. Barnes Drill Company, Rockford, Ill.

(See No. 19)

Electric Tools

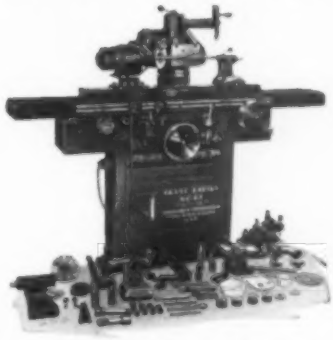
Use postpaid card. Circle No. 20

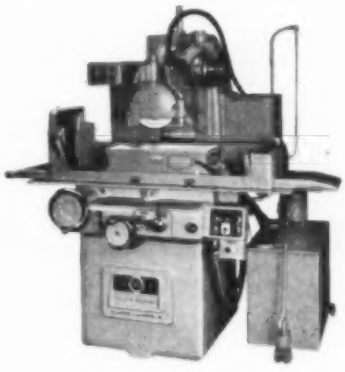
A new 32-page catalog on high frequency electric tools manufactured by Thor Power Tool Co. covers Thor's complete line of tools. Catalog 62. Advertising Dept., Thor Power Tool Co., 175 N. State St., Aurora, Ill.

YOU

CAN FIND THE RIGHT MACHINE FOR YOUR NEEDS ON THESE PAGES

NO. 60 UNIVERSAL CUTTER AND TOOL GRINDER offers precision sharpening, fast set-ups and low maintenance. Designed for maximum convenience of operation, with work weight carried directly over base, permitting operator to stand close to work. Master hand wheel provides three speeds of longitudinal table travel.





NO. 360 HYDRAULIC FEED SURFACE GRINDER. A precision toolroom type which offers absolute accuracy with micro-inch finish at production speeds. One-piece column and base, infinite longitudinal table speeds from 3" to 120' per minute, variable speed cross feed. Available with new incrematic downfeed with automatic spark-out after pre-set stock removal.

NO. 1230 HYDRAULIC FEED O.D. & I.D. GRINDER meets the needs of users requiring a machine that does both internal and cylindrical grinding. It is a rugged, precision tool capable of taking rough cuts as well as producing the finest finish. Has a host of controls and adjustments for maximum convenience and versatility of operation.

A note on your letterhead will bring full details. Please specify the type of grinder you are most interested in.

GALLMEYER & LIVINGSTON CO., 416 Straight Ave., S.W., Grand Rapids, Mich.

GRINDERS

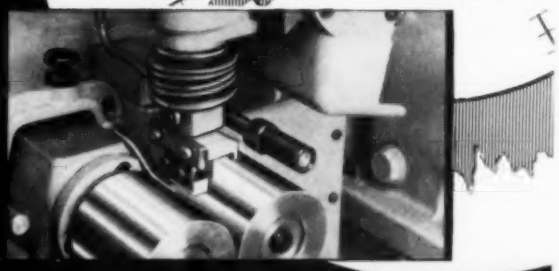
GALLMEYER & LIVINGSTON

Use postpaid card. Circle No. 237

MICROSTONING

Corrects Roundness in Seconds

This Talyrond chart demonstrates the remarkable results from Taft-Peirce Microstoning. Outside trace shows an average roundness of .00028" as ground, inside trace shows roundness improved to an average of .00003", after microstoning! These Taft-Peirce Microstoning heads show where the patented Supfina pneumatic oscillation takes place, driving an abrasive stone at frequency of 1800 to 2000 cycles per minute against a rotating workpiece — achieving desired finish and geometric correction in one operation!



Anyone can get roundness correction if they don't care about time and cost. But, Taft-Peirce Microstoning produces a *controlled* microinch surface finish, removes cutting tool marks, and dramatically improves roundness — all in one simple operation and in a matter of seconds!

You'll find the results in product quality and performance amazing. Shafts and cylinders run quieter, work smoother, won't wear as fast. And you'll find your whole finishing operation is faster, costs less and is easier to operate. All types of metals, hard plastics, and other non-metallic materials can be microstoned.

Try Microstoning on your products! You can use Taft-Peirce/Supfina Microstoners on lathes, boring mills, planers and other machines; or select Centerless Plunge-Cut and Through-Feed Centerless Machines for volume production on small parts. See your nearest Taft-Peirce Agent or send for new Microstoning Catalog No. 319 for detailed information.

Finish it with

TAFT-PEIRCE *SUPFINA*

TAFT-PEIRCE MANUFACTURING CO. 19 MECHANIC AVENUE, WOONSOCKET, R. I.

Use postpaid card. Circle No. 239

FREE LITERATURE *continued*

Grind-All Fixture

Use postpaid card. Circle No. 21

Harig Manufacturing Corporation's new grind-all fixture for grinding irregular shaped perforators is subject of a 4-page folder. Compares old methods with fixture methods and illustrates some of the shapes produced with the fixture. Harig Mfg. Co., 5751 West Howard Street, Chicago 48, Ill.

Rubberized Abrasives

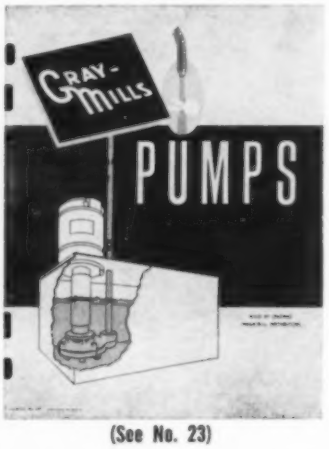
Use postpaid card. Circle No. 22

Twenty-two page manual covers uses and applications for rubberized abrasives. Includes case histories on a variety of applications and outlines most efficient methods for mounting, dressing, and trueing. Also lists recommended operation speeds. Cratex Mfg. Co., Inc., 1600 Rollins Road, Burlingame, Calif.

Pumps

Use postpaid card. Circle No. 23

Centrifugal and gear type pumping units and mist coolant systems are presented in Catalog 56R. Eight-page brochure describes various models, gives specifications, and explains uses and application of each. Graymills Corp., 3705 North Lincoln Ave., Chicago 13, Ill.



(See No. 23)

Vibratory Parts Feeders

Use postpaid card. Circle No. 24

Four-page brochure describes five Elk-O-Matic vibratory parts feeders. Capabilities of and equipment with each model is detailed. Elk Engineering Works, St. Marys, Pa.

Bias-Type Buffs

Use postpaid card. Circle No. 25

Catalog sheet covers complete line of "Red-D-Vent" bias-type buffs manufactured by Divine Brothers Co. Includes sizes, specifications, and descriptions. Divine Brothers Co., 201 Steward Ave., Utica, N.Y.

Rubber Wheels

Use postpaid card. Circle No. 26

Bulletin R-201 covers complete selection of standard size rubber wheels in mounted, straight, and wheel types offered by Chicago Wheel and Mfg. Co. Depicts actual sizes and shapes of rubber polishing wheels for portable grinding and lists dimensions of other types. Chicago Wheel & Mfg. Co., 1101 West Monroe Street, Chicago 7, Illinois.

Profile Grinder

Use postpaid card. Circle No. 27

Catalog sheet SC-154 illustrates and describes the Star No. 3 profile grinder, a floor-type, tilting-table unit that grinds or polishes contours and irregular shapes. Line drawings give table-to-wheel height relationships. Includes listing of accessory equipment. Star Cutter Co., 34500 Grand River Ave., P.O. Box 376, Farmington, Michigan.

Oscillating Grinder

Use postpaid card. Circle No. 28

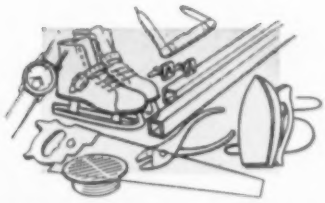
Bulletin TM-860 describes the Tri-Matic oscillating belt grinder and the Tri-Matic oscillating sheet surfacer. Discusses applications of machinery and its various optional features. Sales Service Mfg. Co., 2363 University Ave., St. Paul 14, Minnesota.

(See No. 28)

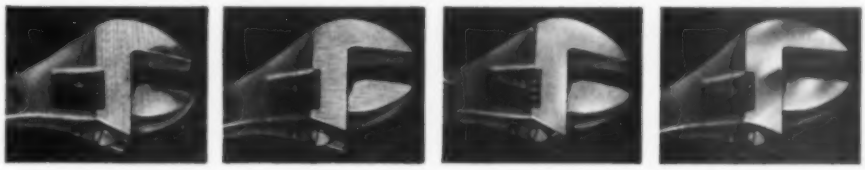
GRINDING and FINISHING

"No, no, Ralph! The guard goes on the wheel!"

ACME IN ACTION



Progressive Finishing—Flat broached forgings ground, polished and buffed on an Acme Automatic Multiple-Head Machine.



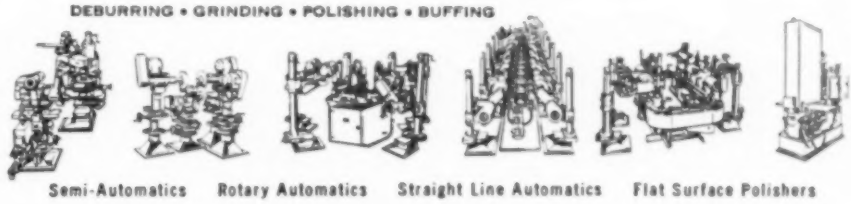
Doing more work with *Movement and Motion*

Designing and building versatile finishing machines that do more work—better, faster, easier, and at lower cost—is a specialty at Acme. Has been, too, for over half a century.

Take the multiple-head flat surface finishing machine shown close-up in action above. It consists of standard Acme components, yet it can be used to perform a number of operations on a wide variety of parts. Deburr, grind, polish—buff or satin finish. All done automatically—in a single pass if desired. What's more, oscillating movement of the conveyor in motion prolongs useful life of abrasive belts and buffing wheels—assures greater uniformity of finish on every piece.

Range of models? Light and heavy duty machines—conveyor belt or pinch roll fed—available in sizes to accommodate your flat parts and products up to 74 inches in width!

DEBURRING • GRINDING • POLISHING • BUFFING



Semi-Automatics Rotary Automatics Straight Line Automatics Flat Surface Polishers

Comprehensive catalogs available upon request. Write, wire or call:

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Leading Producers of Automatic Polishing, Buffing and Deburring Machines Since 1910

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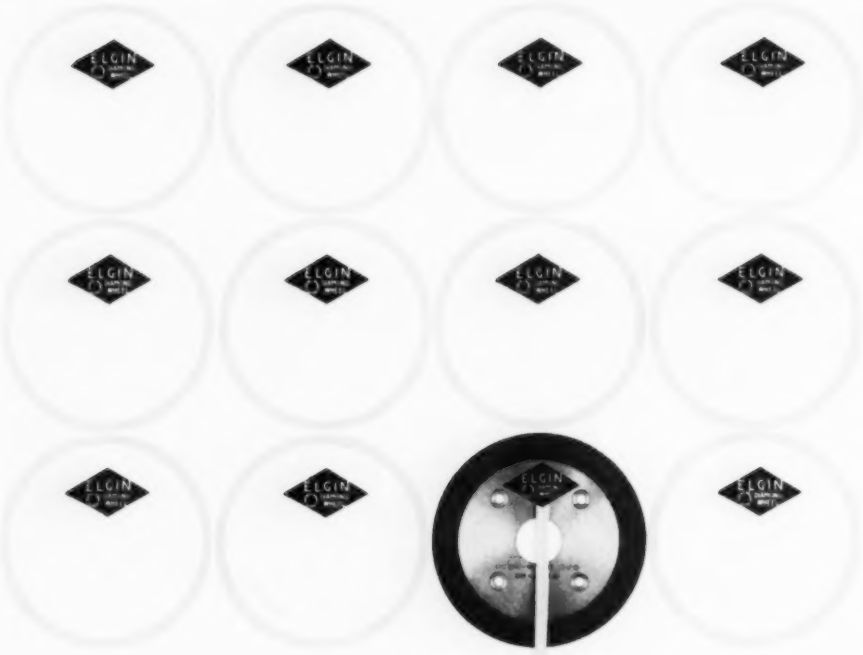


the only diamond that outdoes the wheel

That's no reflection on the diamond in this Elgin wheel. It's just that the diamond we're pointing to above—the Elgin symbol—stands for *all* the fine qualities in Elgin Diamond wheels.

The Elgin Diamond symbol represents our uncompromising production standards. It stands for the top quality performance we demand from every Elgin wheel. It is your assurance that the wheel recommended by your Elgin engineer will do the job you need done and do it best.

Contact Elgin whenever tolerances and surface finishes are critical. Specify Elgin wheels.

Call your local Elgin Abrasives distributor or write for catalog.

ELGIN

ABRASIVES DIVISION
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

Use postpaid card. Circle No. 241

FREE LITERATURE *continued*

Diamond Tool Guide
Use postpaid card. Circle No. 29

Folder, entitled "Staset Diamonds," presents a pictorial story of the proper setup and turning of Staset turn-a-tool diamond tools. Folder is designed primarily as a guide for operations in diamond tool dressing of grinding wheels. The Staset Co., Inc., 66 Franklin Ave., West Orange, New Jersey.

Air Filter
Use postpaid card. Circle No. 30

Bulletin 228 describes uses, construction, installation, operation, and holding frame arrangements for American Air Filter's dry-type unit air filter. Also includes dimensional drawings, performance data, space requirements and suggested specifications. American Air Filter Co., Inc., Louisville 8, Ky.

Finishing Media
Use postpaid card. Circle No. 31

Availability and description list covers uses, types, application, and purposes of "Preforms," used in barrel and vibratory finishing operations. Fortune Industries, Inc., 11770 Dexter Road, Chelsea, Mich.

Diamond Wheels and Hones
Use postpaid card. Circle No. 32

Comprehensive assortment of Star Dust wheels and hones in standard sizes, each under standard type, is listed in catalog "H". Twenty-seven pages of descriptions, specifications, and various types available. Ace Abrasive Laboratories, Inc., 35 Roselle Street, Mineola, N.Y.

(See No. 32)

Grinding Wheels
Use postpaid card. Circle No. 33

Bulletins ESA-141 and ESA-191. ESA-141 discusses general purpose offhand grinding wheels. ESA-191 describes plain cylindrical grinding wheels. Both include grain and grade recommendations for grinding various metals. Simonds Abrasive Co., Tacony & Fraley Streets, Philadelphia 37, Pennsylvania.

HANDBOOKS COVER PROPERTIES OF METALS AND COST REDUCTION FOR MANAGEMENT

METALS HANDBOOK, 8th edition, Vol. 1—Properties and Selection of Metals. 8¼ by 10⅞ inches. 1300 pages. 1300 contributors. 6700 illustrations. 1841 tables. Over 1500 examples. 2806 definitions. Data compilations on 456 alloys. American Society for Metals, Novelty, Ohio. $30.00.

With greatly increased and intensified coverage, the new ASM Metals Handbook, Volume 1, is devoted exclusively to the selection and properties of metals. It is the first of a projected series which when completed will cover all branches of metals engineering and metalworking.

This volume not only provides a large storehouse of reliable information about metals, but also emphasizes the factors of economy and fabrication in their selection. More than 1300 specialists are named as contributors.

A greatly enlarged section on carbon and low-alloy steels consists of 26 major articles—12 on steel products and 14 on selection for specific engineering properties, economy, and special processing considerations. Included in this 286-page section are articles covering all commercial steel product forms, and articles dealing specifically with selection for maximum yield strength at minimum cost, hardenability, fatigue resistance, notch toughness, wear resistance, and resistance to corrosion.

Major processing factors are covered in articles on selection for economy in machining, selection of low-carbon steel sheet formability, deep-drawing, and porcelain enameling.

The new Handbook contains roughly 2½ times as many pages on selection and properties of metals as were contained in the previous edition. Again, compared to similar subjects in the previous edition, the new volume offers nearly six times as much numerical information (as distinguished from descriptive text) in the form of charts, graphs, and tables.

Many articles dealing with metal selection for specific engineering properties are entirely new. The section on stainless steels now provides ample coverage of all stainless steels (cast and wrought), including the more recently developed precipitation-hardening alloys.

A major section on tool materials includes 18 articles on 18 specific types of tools. Aluminum, copper and the other major nonferrous metals are amply covered. Other sections are devoted to iron-base super-strength alloys, nickel-base and cobalt-base alloys, titanium and titanium alloys.

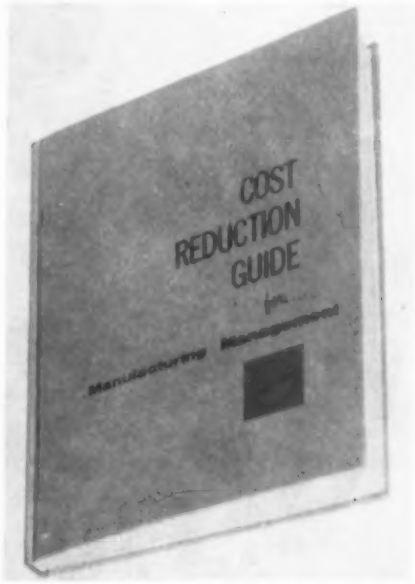
More pages than ever before are assigned to magnetic, electrical, and other special purpose metals, precious metals, and—a subject of rapidly expanding interest—the properties of pure metals. A glossary of 2800 definitions appears at the front of the book.

COST REDUCTION GUIDE FOR MANUFACTURING MANAGEMENT. 8½ x 11 inches. 256 pages. Written and published by E. E. Wyatt and H. Clifton Morse. Distributed by Hitchcock Publishing Company, Wheaton, Illinois. $18.00.

This guide has been written by the principals of Wyatt & Morse, Inc., after more than seven years of experience in the installation and administration of cost reduction programs. Sample forms, progress reports, letters, and illustrative cases make the contents suitable for practical operation.

Virtually every area of management is included. Administration, manufacturing, financial and management controls, electronic data systems, product and plant engineering are some of the functions involved.

Much of the material is based on successful cost reduction programs of over forty companies. These companies support the authors' view of the need for continuing cost reduction programs.



Presented in non-technical language, this guide offers step-by-step instructions for starting and carrying out complete programs in improved operations through reduction of costs. Over 1200 cost-related questions enable a company to audit its entire operation.

Also included are 200 tested waste prevention ideas and 100 examples of what projects cut costs.

now... a finer, faster finishing touch created by three-dimensional vibration

The unique action of media in the New SWECO Vibro-Energy Finishing Mill literally "reaches around corners" to deburr and finish all surfaces better and quicker than ever before possible. The reason: highly efficient energy conversion to media and parts in work via high-frequency, yet gentle, three-dimensional vibration. The SWECO Vibro-Energy technique has been used for many years in the accurate separation of thousands of screenable materials. Also, Vibro-Energy has been successfully applied to ultra-fine (sub-micron) wet-grinding and dispersion. Following extensive development and field testing, SWECO Vibro-Energy now brings important economies and advantages to deburring, finishing, polishing, coloring and burnishing. An illustrated technical paper describes the principle and profit potential of this new SWECO application to metal, ceramic and plastic parts. A copy will be mailed promptly at your request. Write SOUTHWESTERN ENGINEERING COMPANY, 4800 Santa Fe, Dept. 85426 Los Angeles 58. *Vibro-Energy Separators, Grinding Mills, Finishing Mills*

SWECO

Use postpaid card. Circle No. 243

MORE BASIC ABRASIVE RESEARCH NEEDED

The need for more basic abrasive research and less price-buying was cited by **Otto L. Forchheimer,** manager, chemistry division, Trionics Corporation, Madison, Wisconsin at the Chicago Chapter's April meeting. Fifty members and guests attended.

"After sixty years or more," he said, "we still do not really know what makes an abrasive." He noted that two recent products, zirconium oxide as an abrasive and a tungsten carbide coated wheel for grinding rubber, had been developed by companies outside the abrasive industry.

He cited the work done by a number of companies, but indicated the necessity of exploring the abrasive possibilities of other materials.

The wide-spread trend toward buying on price alone, without regard to performance, was also recognized as a deterrent to research. Forchheimer suggested that American firms have balked at higher prices for new products, even when the process cost per unit is lowered. This, he said, is a general pattern not confined to grinding wheels.

A spirited question-and-answer period completed the session.

A discussion of coolant cleaning is scheduled for the May 11 meeting, with Arthur L. Wilson, Olson Filtration engineer, as the speaker.

The annual golf day, and election of officers, Saturday, June 10, closes the season.

ANNICH EXPLAINS WORK SIMPLIFICATION FOR N.J.

Milton Annich, director of industrial engineering for American Brake Shoe, Mahwah, New Jersey, and a national director of ASA, led the New Jersey chapter in a discussion of work simplification at their March 15 meeting.

Twenty-five members and guests attended the meeting at the Blue Shutter Inn, Union, New Jersey.

A series of slides supplemented the talk.

CLEVELAND GROUP TOURS FORD ENGINE PLANT

Cleveland chapter members and their guests—110 strong—toured Ford Motor Company's Engine Plant No. 2, Brookpark, Ohio, for their April meeting.

After a 6:45 pm dinner in the plant cafeteria, the group viewed a sound film of the engine plant. Following the film and a short business meeting, they toured both units, to watch in the words of the announcement, "some of the most modern methods of automobile engine manufacture."

DETROIT TEAM DEBATES SYNTHETICS, EMULSIONS

A coolant analysis debate—synthetics vs. emulsions—highlighted the Detroit chapter's March meeting at the Warren Valley Golf Club.

The presentation was billed as providing a direct job comparison of the applications, requirements, and results of the two types.

The participants were **Les Rousseau,** district manager for the Industrial Division, S. C. Johnson & Son, Inc., and **Ed Maddock,** vice president, Michigan Mfg. Service, Inc. Other area representatives of coolant suppliers were on hand to round out the discussion period following the debate.

CONNECTICUT CHAPTER TOURS CARPENTER STEEL

An evening tour of Carpenter Steel of New England, Inc., attracted fifty members from the Connecticut chapter on March 27. The tour was limited to members only.

Walter Schlegel, chief metallurgist, **James MacMinn,** superintendent of billet preparation, and **Robert McGee** were the guides.

The April 24 meeting for Connecticut was a discussion of barrel finishing by **N. L. Watkins** of the Carborundum Company.

LONG ISLAND DISCUSSES NEW CARBIDE

Stuart E. Tarkan, of Chromalloy Corporation's Centercast Division, talked on the fabrication and general applications of Ferro-Tic, a new steel-bonded, heat-treatable carbide, at the April 12 meeting of the Long Island chapter.

LAPPING UNIT APPLIES ABRASIVE AUTOMATICALLY

Automatic abrasive application is one of several features on Speedlap's new 12" lapping machine. Designed for compactness and economy, the unit is constructed of stainless steel and has a speed-alloy reversible lap plate which is serrated on one side, solid on the other.

The machine has four 4½" I.D. rings and maintains positive flatness control. It is usable in research laboratories, solid state metallurgical development laboratories, maintenance, tool and die shops, and in fully equipped home workshops.

The stainless steel construction prevents contamination. Typical production features are that it produces flatness to .000003 and better with surface finishes two rms and better, and parallelism of .000050 tolerance.

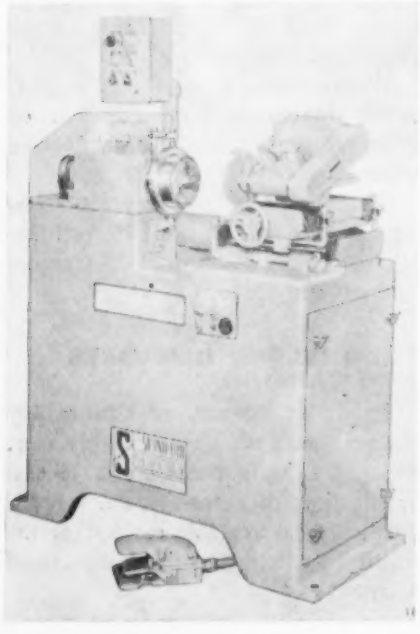
Speedlap Corp., Dept. 150, 3636 West Oakton St., Skokie, Ill.

Use postpaid card. Circle No. 34

GRINDING WHEEL HEAD FOR FAST SPINDLE INTERCHANGE

The grinding wheel head, powered by a ½ hp motor, allows for instant interchange of the 6" external spindle for a wide range of interchangeable internal spindles.

The manual cross feed will adjust the wheel head in position for internal grinding or a maximum of 6" external grinding. The head stock is available in a wide range of designs from internal taper, external taper, through-hole in the spindle, and all types of working-holding equipment. The collet is opened and closed by a foot-pedal switch.



The horizontal traverse is powered by hydraulically controlled air cylinders. The dovetail slide with non-metallic ways has oil grooves and gravity holders.

The pendant-type switch panel allows for manual or completely automatic operation, or a portion thereof. The unit incorporates a 2-speed, 1800/1900 rp, motor with built-in automatic brake for head stock operation.

In addition to the foot switch, the control panel permits independent start-stop through magnetic starters of the head stock and wheel head motors, individual start and stop cycle buttons for the power traverse, and an emergency stop button.

Standard Electrical Tool Co., 2488-96 River Road, Cincinnati 4, Ohio.

Use postpaid card. Circle No. 35

ELECTROLYTIC DRILL GRINDER IS VERSATILE

The Ampak Electrolytic High-Speed Drill Sharpener makes possible relative combinations of point angle, lip relief angle, and helix angle to solve all metal cutting needs.

It allows a greater degree of control of point geometry than ever before possible, holding grinding tolerances on drills ⅛" to 1" diameter to .0001 and to ±1/10° on angular grinding.

Fixturing on the sharpener allows pin-point control of any of the following drill point dimensions: point angle from 90° to 180°; lip relief angle from 0° to 20°; and helix angle from 30° positive to 30° negative.

The unit is powered by the Ampak Electrolytic power pak, a variable 1 to 8 volt, 300 Ampere DC power converter.

Connecticut Special Machine Inc., Bridge Street, Winsted, Conn.

Use postpaid card. Circle No. 36

ADJUSTMENT COMPENSATES FOR DIAMOND TOOL WEAR

A special control mechanism permits precision control adjusting over diamond point wear in grinding wheel dressing and related machining applications. The mechanism incorporates the patented Briney principle that allows adjustment in split-tenths (1/10,000" and finer) without loosening or tightening any screws.

Built into the grinding wheel dresser arm, the mechanism is connected directly to the diamond holder. Turning a calibrated knob the required distance adjusts the diamond point accordingly.

Briney Mfg. Co., Box 208, Pontiac, Michigan.

Use postpaid card. Circle No. 37

INVOLUTE CHECKERS MAKE SETTINGS OPTICALLY

Operator variables from measurement are removed by "Sine-Line" involute checkers in which settings are made optically.

Angles can be set within .001 deg. without use of gage blocks. Checking accuracy is repetitive within .0001"

These checkers use a sine bar to obtain proper ratio between the single master disk and the base diameter of the gear being checked. Gears from 1 d.p. to 30 d.p., or higher can be checked, although a special contact point is required for very fine pitch gears.

Denham and Co., 925 Book Building, Detroit 26, Mich.

Use postpaid card. Circle No. 38

QUICK ACTING DIAL MICROMETER

One full turn of the spindle of a new, quick-acting dial micrometer covers the entire .250" operating range. Thickness is read on the large, highly legible dial.

The micrometer is available with standard .270" diameter terminals or with large ¾" diameter terminals for measuring soft materials.

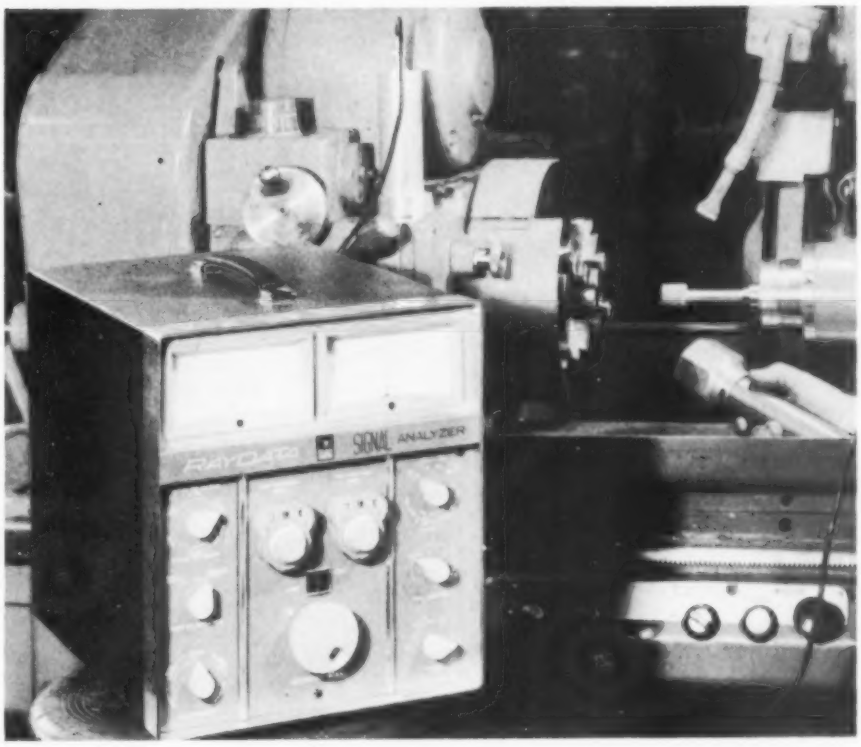
The adjusting nut assembly provides for full engagement with the spindle thread, making the instrument shockproof.

The dial micrometer is ideal for use in rolling mills, for gaging sheet stock thickness while the mill is in operation, and other manufacturing situations where the part to be measured is in movement and the time allowed for measurement is minimized.

J. T. Slocomb Co., South Glastonbury, Conn.

Use postpaid card. Circle No. 39

PORTABLE BALANCER ANALYZES VIBRATION



A vibration signal analyzer and portable balancer, developed by the RayData Corporation, is designed for the study and analysis of vibration sources in machinery, buildings, and pipe lines.

Continuous machine monitoring is obtained by comparing present machine performance with specific data or past performance. The unit can provide a continuous record of machine characteristics, which will assist in determining optimum production speeds, production schedules, and maintenance procedures.

RayData Corp., Dept. R2, 1078 East Granville Road, Columbus 24, Ohio.

Use postpaid card. Circle No. 40

PLASTIC TYPE DEBURRING MEDIA PERFECTED

The Fiber Resin Corporation has perfected a plastic-type media for use in vibrator deburring machines.

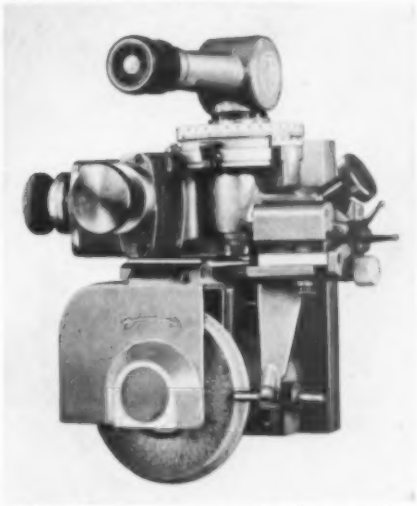
Vibra Tabs, made of a fast-cutting synthetic abrasive, combat discoloration, and parts come from vibrator or barrel with clean, natural color.

Vibra Tabs correct the problems of media impingement or peening and of burrs being turned as well as fine edges. Although perfected for vibrator units, Vibra Tabs may be used in barrel finishing operations also. Their wearing quality is greater than other synthetic types, and they can be used on any metal.

Fiber Resin Corp., 125 West Verdugo Boulevard, Burbank, Calif.

Use postpaid card. Circle No. 41

DRESSES GRINDING WHEELS OPTICALLY



Optidress, a new attachment for optical dressing of grinding wheels, can be permanently mounted to practically any standard surface or tool and cutter grinding machine. It eliminates the need for templates and requires no set up between grinding and re-dressing.

The unit has a built-in 10X micro-

continued

scope with a radius reticle and 6 min. vernier for accurate setting of the diamond. Radius and two tangent angles may be dressed in a continuous motion.

Micrometer cross slides are provided to permit the dressing of any combination of radii and angles into an intricate form on the wheel. Optical control eliminates "cut-and-try" methods and assures blend between radii and angles.

Optical Division, Parker Hartford Corp., 650 Franklin Avenue, Hartford, Conn.

Use postpaid card. Circle No. 42

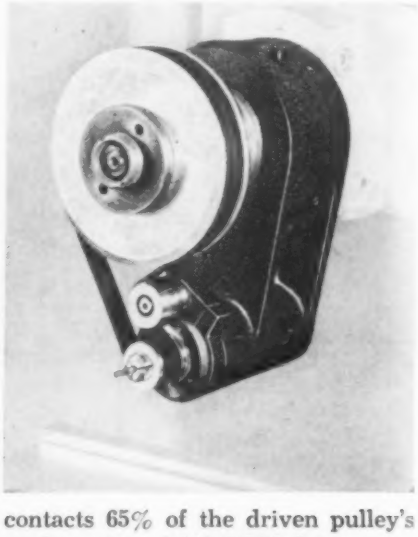
PRECISION GRINDER MADE FOR HARD-TO-REACH AREAS

The "Diamond Speedgrind" has been designed for use in hard-to-reach areas where high precision surface grinding is desired.

Models of this unusually compact attachment are available to fit most surface grinders.

The unit's body is made of a special alloy casting. Bulk has been kept at a minimum to let the operator get closer to the chuck.

A slipless belt tension adjustment eliminates bearing strain. The belt



contacts 65% of the driven pulley's surface. At a 3,600 RPM drive spindle speed, the unit delivers 17,000 RPM.

It is available with a choice of 3/32", 1/8", 3/16", or 1/4" collet or a mandrel for ¼" or ⅜" I.D. unmounted wheels. Recommended wheel diameters are 3/32" to 1½". Special size and length mandrels are available.

With steel storage case and choice of collet or mandrel, the price is $295.

Speedline Sales Co., 12860 Fisk Avenue, Warren, Mich.

Use postpaid card. Circle No. 43

MALLEABLE ABRASIVE

A new heat process which reduces graphitic carbon levels is responsible for the effectiveness of a high-hardness malleable abrasive which increases cleaning action speed without decreasing the life of the abrasive.

National Metal Abrasive Co., 3650 Norton Road, Cleveland 11, Ohio.

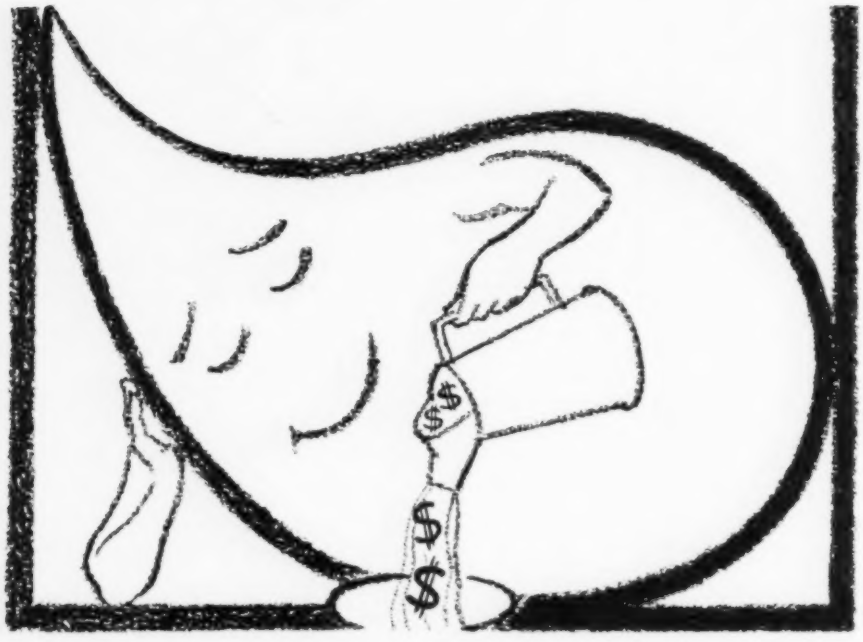
Use postpaid card. Circle No. 44

BIAS-TYPE BUFF

A 3" ventilated metal center bias-type buff incorporates a one-piece flat internal steel binder ring for added safety. The binder ring locks the cloth in place and eliminates the need for jagged fastening ring teeth.

Divine Brothers Co., 202 Seward Ave., Utica, N.Y.

Use postpaid card. Circle No. 45



Is a lazy coolant pouring your profits down the drain?

Do you have to change your grinding coolant too frequently? Does it become rancid quickly — fail to keep the wheel open or settle chips properly?

Are you getting poorer finishes, lower stock removal and less wheel life than you think you should?

If so, switch to White & Bagley *lively* coolants. There's not a tired ounce in a tankful!

For about 1¢ a gallon coolant cost, use W&B Chemical Concentrate 1500 for grinding steel. W&B E-55 is recommended for steel, cast iron and nonferrous metals. Both concentrates give extremely keen grinding action.

For grinding AND cutting, use W&B Lubricant 1888 — a high detergent, oil-type, water soluble concentrate for better finishes.

For very tough grinding and cutting jobs, W&B HD Soluble Oil 2213 (heavy duty) provides extra lubricity, exceptional support for the cutting tool or grinding wheel.

For critical thread, gear, tap and form grinding, W&B Grinding Oil 1572 is the standard of the industry.

Write for facts about cost-saving coolants to: The White & Bagley Co., 88 Foster St., Worcester, Mass.

THE WHITE & BAGLEY CO.

Worcester, Massachusetts · Detroit, Michigan

Originators of Grinding Lubricants

Use postpaid card. Circle No. 246

FOR 18-INCH VERTICAL SPINDLE SURFACE GRINDERS

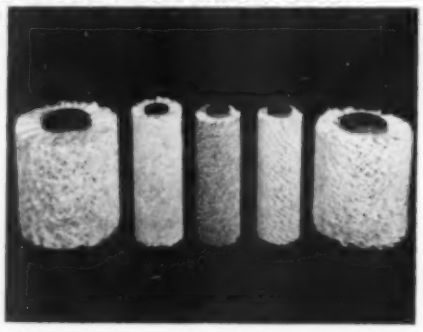
A grinding wheel for use on 18-inch vertical spindle surface grinders features a hexagonal-shaped hole which acts as an "agitator." It keeps the direct flow of water inside the wheel in constant circulation.

An ability to grind thin work with less danger of heat distortion, continuous grinding action on small work pieces, and reduced vibration are other advantages of this combination cylinder-segmental type wheel.

American Emery Wheel Works, 1 Richmond Square, Providence, R.I.

Use postpaid card. Circle No. 46

BUFFING WHEEL PERFORMS DOUBLE CUTTING ACTION



The continuous spiral construction of the Churchill Spyri-Roll buff provides a double cutting action by the buffing element. The element rotated against the work provides one cutting action, while its sideways movement, due to its spiral or helical construction, provides another.

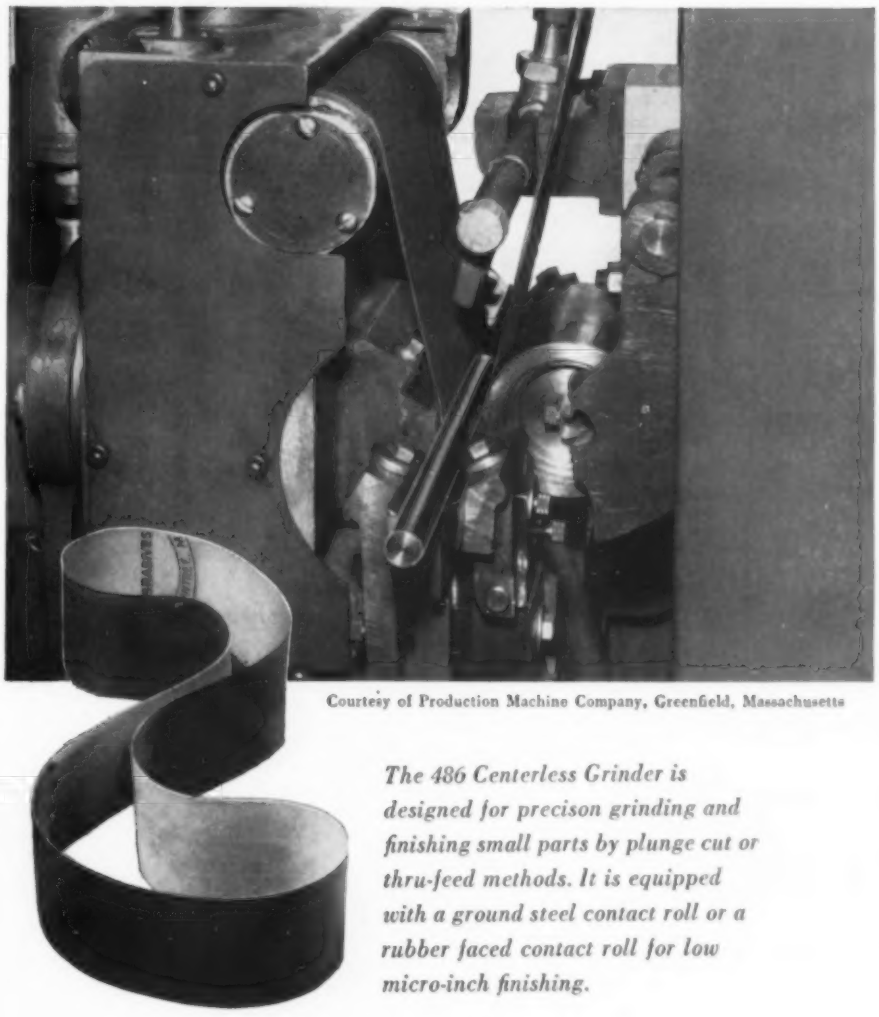
The buff is made from one continuous strip of buffing element or material. No special equipment is needed for mounting on arbors.

It is particularly adaptable on machines where the work traverses the face of the buff. The bias type is excellent for flat sheet polishing.

Geo. R. Churchill Co., Inc., Churchill Road, Hingham, Mass.

Use postpaid card. Circle No. 47

for a superior finish when centerless grinding specify Jewel Brand abrasive belts



Courtesy of Production Machine Company, Greenfield, Massachusetts

The 486 Centerless Grinder is designed for precison grinding and finishing small parts by plunge cut or thru-feed methods. It is equipped with a ground steel contact roll or a rubber faced contact roll for low micro-inch finishing.

No matter what the grinding method or the operation to be performed, there's a Jewel Brand abrasive belt designed for it. That's why experienced operators specify Jewel Brand. They know they'll get the right bond, the right backing and the right grain.
Next time, why don't you specify Jewel Brand?

For a trial run, call your industrial distributor or write: Abrasive Products, Inc., South Braintree 85, Mass.

JEWEL BRAND

COATED ABRASIVES

belts • rolls • sheets • discs • specialties

Use postpaid card. Circle No. 247

UNIT HAS INDEPENDENT SPINDLE HEADS

Mecha-Finish's new MM-2 high speed, two-spindle unit features two independently operated spindle heads which allow the machine operator to service one spindle while the other is in process.

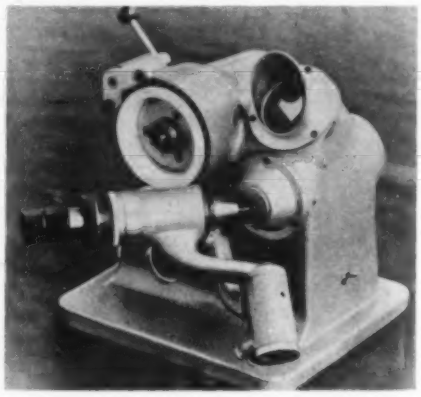
Designed for low production of a multiplicity of parts or for high production of a single piece, the unit can also be supplied with spindle stations interlocked for the purpose of pacing the machine operator.

At a 15-second time cycle, the unit will produce 240 pieces per hour and has capacity up to 6" diameter piece part. It is completely automatic in operation except for loading and unloading. The parts are mounted on spindle fixtures which are submerged while rotating in a fluid abrasive mass that travels at about 2000 sfm and simulates a form-fitting grinding wheel.

Mecha-Finish Corp., P.O. Box 308, Sturgis, Mich.

Use postpaid card. Circle No. 48

SOLVES TWIST DRILL SHARPENING PROBLEMS

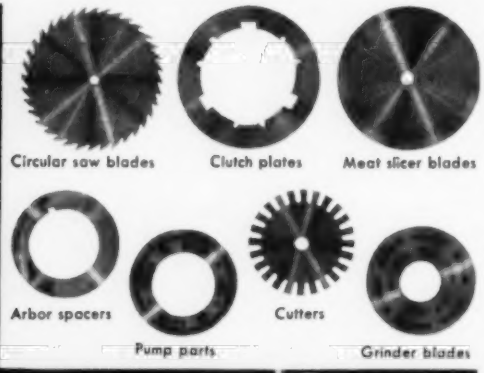


A solution to the chore of keeping small twist drills properly sharpened is offered by the optical "Tatat" drill grinder.

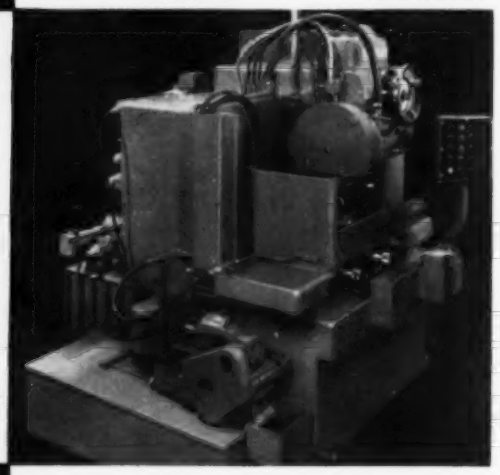
The compact, bench-type machine, holds the drills in a quill equipped with a self-centering chuck or collet. After chucking the drill the quill is axially moved until the drill point locates a scratch-proof sapphire stop.

The drill point image appears in episcopic projection, magnified 10 or 20 times, on a large screen where a

For superior FLATNESS, PARALLELISM, and FINISH on parts like these...



...this is the machine for you to buy!



Here are some of the reasons why... ⟶

MODEL E ROTARY SURFACE GRINDER

- Rugged column and long ways permit both heavy stock removal and fine finishes.
- Tiltable table for concave or convex grinding.
- Concentric line grinding pattern.
- Ruff and fine wheel feeds permit both operations on same machine.
- Compensation for wheel wear or wheel dressing doesn't disturb feed setup.
- Sundstrand magnetic chuck is standard equipment.
- Pushbutton automatic grinding cycle.

Send for Bulletin No. A-377

SUNDSTRAND ARTER

SUNDSTRAND MACHINE TOOL

BELVIDERE, ILLINOIS • Division of Sundstrand Corporation

Use postpaid card. Circle No. 248

number of orientation lines permit instant positioning. The quill can be positively indexed 180° for subsequent grinding of the cutting edge.

Over-all range of the unit for straight shank drills is from .0135" (No. 80 drills) to 19/32" twist drill diameter, covered by three quills.

Eric R. Bachmann Co., Inc., 27-11 41st Ave., Long Island City 1, N.Y.

Use postpaid card. Circle No. 49

MAHR BENCH MICROMETER READS IN 50 MILLIONTHS

The new Mahr Indicating Bench Micrometer, with a 1" measuring capacity, reads directly in 50 millionths or in 10 millionths with an interchangeable comparator head.

Eleven different types of interchangeable anvils can be obtained for checking small precision parts.

Tapered shanks on the anvils assure interchangeability within seconds, guaranteeing parallelism between anvil faces.

Mahr Gage Company, Inc., 274 Layfayette Street, New York 12, New York.

Use postpaid card. Circle No. 50

CENTER HOLDS WORK WITH DRIVING PINS

Set-up time for machining work is reduced with the use of "Power Grip" driving centers which grip the workpiece with driving pins. No chucks, clamps, or dogs are involved.

A deformable plastic material serves as a hydraulic medium to give all the pins an equal bite. Even with irregular surfaces, the pins make contact with the work because the plastic transmits an equal force to all of them.

Work can be loaded and unloaded without stopping the machine. A rigid direct drive action reduces backlash and eliminates slippage.

Power Grip, Inc., Rockfall, Conn.

Use postpaid card. Circle No. 51

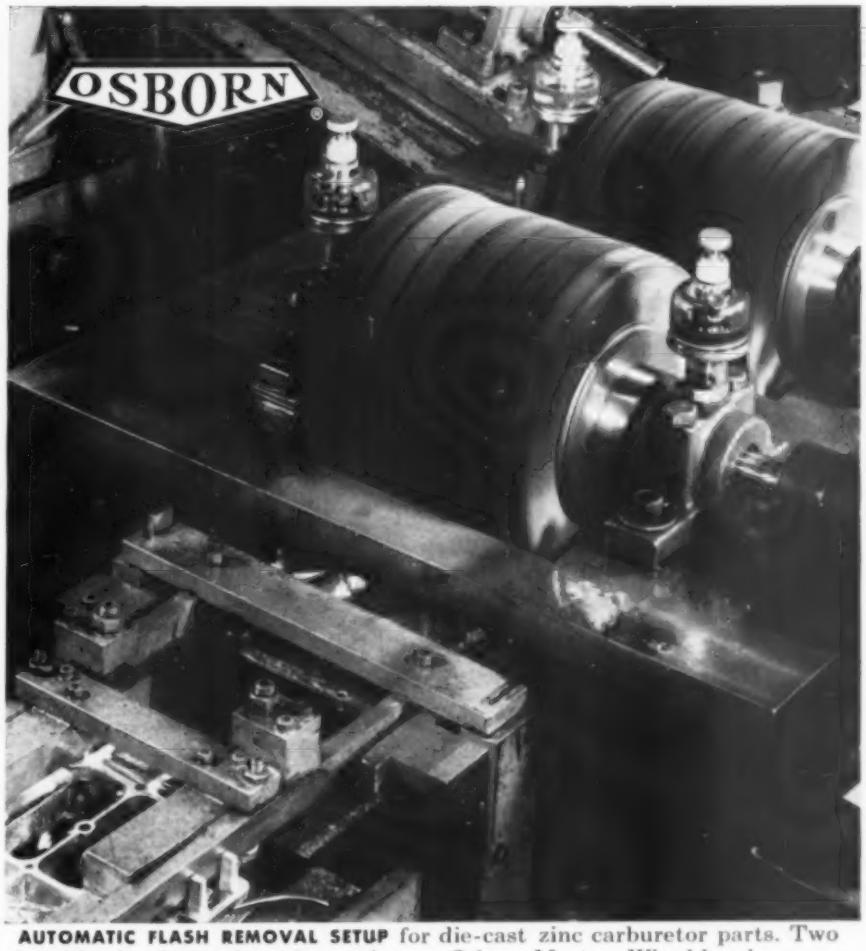
NEW CUT-OFF WHEELS AVAILABLE FOR TRIALS

Twelve sizes of 24-grit reinforced cut-off wheels and 10 sizes of several grits of non-reinforced wheels are available for production trials.

Reinforced types are designed for deep cuts or where side pressure is a factor. The non-reinforced types are for short cuts or where setups are rigid enough to minimize side pressure.

Peninsular Grinding Wheel Co., 729 Meldrum Avenue, Detroit 7, Michigan.

Use postpaid card. Circle No. 52



AUTOMATIC FLASH REMOVAL SETUP for die-cast zinc carburetor parts. Two brushing heads—each made up of seven Osborn Master® Wheel brushes—are mounted over the conveyor. Parts (shown fixtured in lower left corner) pass under brushing heads where all flash is removed as they travel to next work station.

OUTPUT TRIPLED from 200 to 600 an hour with OSBORN power brushing

Before: this auto equipment maker was using costly off-hand methods to remove flash from these die-cast zinc carburetor parts. Production was slow . . . it varied from shift to shift, averaging about 200 pieces per hour.

Now: parts are Osborn power brushed clean as they travel between work stations by conveyor . . . *eliminating manual handling.* The setup of Osborn Master® Wheel brushes does the job at rates up to 600 pieces per hour . . . *three times as fast.* The operation is simple, inexpensive. Results are uniform, with excellent quality control.

This application is typical of how *your* tough metal finishing problems of every description—deburring, cleaning, polishing, precision blending—can be solved with today's Osborn power brushes and brushing methods. An **O**sborn **B**rushing **A**nalysis—made at no obligation in your plant now—is the first step. Write or call *The Osborn Manufacturing Company, Dept. G-10, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

VISIT OUR BOOTH '61 NEW YORK COLISEUM ALL-METAL TOOL EXPOSITION MAY 22-26

Booth 2407

Osborn Brushes

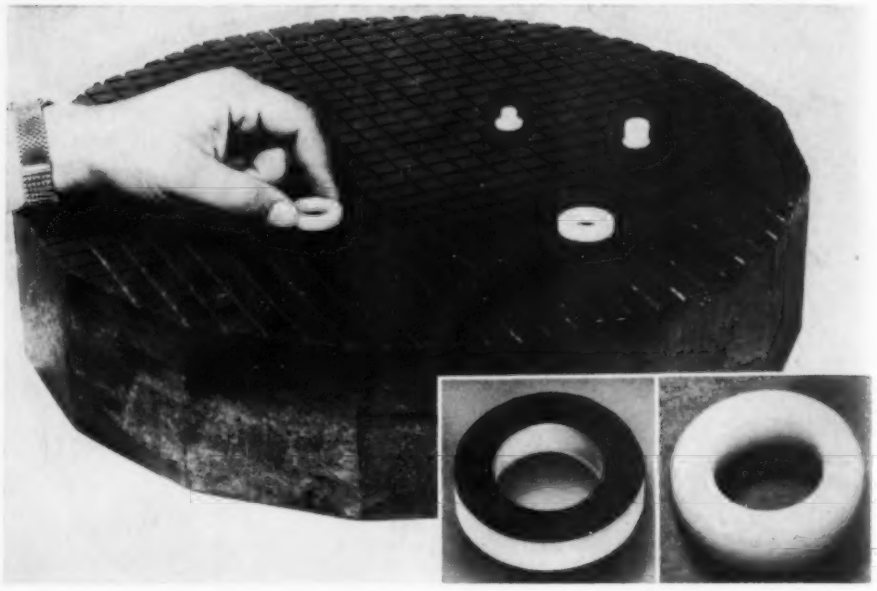
Metal Finishing Machines . . . and Methods • Industrial Brushes • Foundry Production Machinery

Use postpaid card. Circle No. 249

HAND LAPPING PLATE IS NON-CONTAMINATING

A new non-contaminating hand lapping plate that produces fine finishes on Teflon, nylon, and other non-ferrous materials is said to have three principal advantages: finer surface finish, better appearance; and elimination of the danger of a contaminator causing malfunctioning of the lapped part.

The plates are 12" and 18" in diameter and 3" thick. The lapping surfaces are grooved with ⅛" serrations spaced ½" apart.

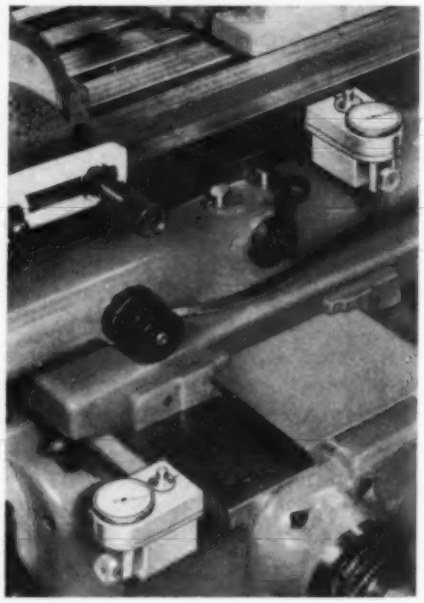


The black granite used for the surface plates is one of the earth's hardest, most impervious, and most stable natural engineering materials.

The DoAll Co., Des Plaines, Ill.

Use postpaid card. Circle No. 53

SIMPLIFIES GAGING OF LINEAR MEASUREMENTS



Picking up linear measurements when grinding precision AN reamers, spot facers, milling cutters, form tools, etc., is simplified with Trav-A-Dial.

Measurements are made by a gage wheel contacting a way or machined surface. A dial knob gives a continuous motion record up to 6" of travel, repeating on any length of traverse. Readings are guaranteed to an accuracy of .001" in 6" of travel.

Southwestern Industries, Inc., 5880 Centinela Avenue, Los Angeles 45, California.

Use postpaid card. Circle No. 54

BREAK COST-BARRIERS

with timely

BRIGHTBOY

Rubber Cushioned Abrasives

Multi-use Brightboy extensively broadens the scope of abrasive applications, replacing various older, costlier methods. Now, more than ever, you probably can utilize Brightboy's economical new concept for working:

ALL METALS • WOOD • GLASS
FIBERGLASS • LAMINATED MATERIALS
SOME PLASTICS

Brightboy's simultaneous rubber-and-abrasive working action frequently reduces:

BURRING • CLEANING
FINISHING • POLISHING

to one operation

WIDE RANGE OF READILY AVAILABLE STOCK TEXTURES FOR IMMEDIATE DELIVERY

The only complete, comprehensive line of soft rubber bonded abrasives. Available in Silicon Carbide and Aluminum Oxide stock textures — extra fine to extra coarse — in soft, semi-firm, firm and tough rubber binders. Revolutionary Brightboy is saving money for countless users now, in machine, manual and automation operations.

WRITE NOW FOR BRIGHTBOY'S CATALOG-MANUAL *covering:*

- Methods & Applications
- Machine Speeds
- Job-Matched, Stock Wheels, Sticks, Rods, Blocks & Points
- Wheel Sizes — Complete Range

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

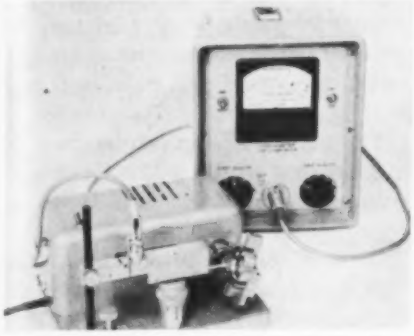
BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.

95 North 13th Street Newark 7, N.J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives

Use postpaid card. Circle No. 250

UNIT CHECKS SURFACE ROUGHNESS IN PRODUCTION



The Profilometer Type RE Rotary Pilotor provides a means for high-production checking of average surface roughness in microinches around surfaces of rotation and across the radii of small parts, both internal and external.

Surfaces of rotation or radii from approximately 1/32" to approximately 2" or more can be handled easily. The selection of any desired arc of trace from 10° to 350°, with automatic reversals, has been provided for.

The Type RE Pilotor is used in connection with a standard Amplimeter and Tracer. Either arithmetical or rms average readings are possible.

Micrometrical Mfg. Co., 3621 South State Road, Ann Arbor, Mich.

Use postpaid card. Circle No. 55

ELECTROLYTIC GRINDERS FOR HIGH PRODUCTION WORK

The Hammond Models EGD-12 and 14 duplex oscillating electrolytic grinders are built for push-button, high production electrolytic grinding of carbide and steel or alloy steel parts. The grinding is burrless and free from metallurgical damages.

The units carry 12 and 14" wheels. The 12" can have a face up to 3"

The Beginning of a Revolution!

Look for "G"—the identifying prefix of a J.K.S. Man-Made Diamond Grinding Wheel.

G D100 R100 BE 1/8
J. K. SMIT & SONS

J.K.S. Diamond Wheel Developments
Slash Grinding Costs—Speed Production

Now, one of the world's most experienced manufacturers of diamond grinding wheels has brought its technical knowledge to the production of man-made diamond wheels.

The result is a revolutionary advance. Today's new J.K.S. man-made diamond wheels give longer life in many applications . . . speed up production on many difficult grinding jobs. Yet there is no extra cost . . . they are now priced the same as wheels made with natural diamonds.

In these wheels, too, you get a famous J.K.S. plus value: exact uniformity in wheel construction . . . duplicated in wheel after wheel . . . an advantage that results from special J.K.S. techniques and quality control.

NEW DIAMOND WHEEL CATALOG NO. 65

A necessary reference publication for everyone who buys or uses diamond grinding wheels . . . send today for Catalog, "J.K.S. Diamond Wheels, Saws and Hones."

J. K. Smit & Sons, Inc.
Home Office and Plant
MURRAY HILL, NEW JERSEY
DETROIT, MICH.

Use postpaid card. Circle No. 251

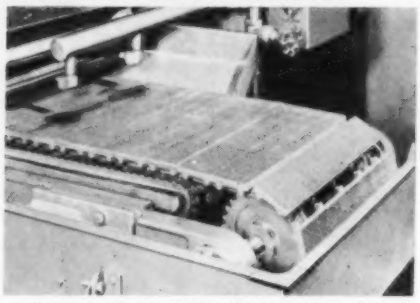
wide and the 14", up to 4". The spindle oscillates on tapered roller bearings with a variable stroke of 0" to 2" and a frequency of 50 per minute.

The tables can be mounted in two positions. Each is fed by an air cylinder. Grinding pressure is controlled with an air control valve. For very light pressure each cylinder can be resisted with a variably adjustable spring.

Hammond Machinery Builders, Inc., 1651 Douglas Avenue, Kalamazoo, Michigan.

Use postpaid card. Circle No. 56

NEW CONVEYOR PERMITS WORK ON MOST SHAPES



A new, easily-fixtured chain block conveyor used with a Tri-Matic Oscillating Belt Grinder permits grinding on a piece of practically any shape.

The conveyor drive, when arranged to reciprocate, provides a surface grinder that grinds the full width of the table at one pass. Fixtures may be bolted to the chain blocks, located on pins, against stops, or in a number of other ways.

The chain blocks provide a solid base, making it possible to hold close tolerances. They also may be covered with neoprene or other material for grinding, polishing, and buffing flat parts and sheets.

The abrasive belts can be changed quickly and easily, making one machine practical for all types of operations.

Sales Manufacturing Co., 2363 University Avenue, St. Paul 14, Minnesota.

Use postpaid card. Circle No. 57

HONING LAP

Rated for lapping and stoning with diamond equivalency, a new honing lap is recommended for handling all metals and materials including plastics and carbides with a manufacturer's guarantee that the lap will not load. Used wet or dry, the lap can be easily resurfaced by ordinary surfacing.

Newtools, Inc., Box 1, Amityville, New York.

Use postpaid card. Circle No. 58

SELF-ALIGNING FLANGES

Cosmo-Contact wheels with self-aligning flanges reduce vibration and are economically priced. They are constructed of ⅛" steel discs, and are faced with a rubber cushion that fits up snug to any worn or scored shaft. Centrifical force gives perfect alignment and balanced, vibration-free operation.

Cosmo-Wheels, Inc., 1019 Fulton St., Chicago 7, Ill.

Use postpaid card. Circle No. 59

BACKSTAND DRIVEN BY ANY POWERED WHEEL

A new backstand for deburring, surfacing, squaring, grinding, and polishing may be driven by a lathe wheel or any other powered wheel. It employs a mounted idler roll and a special "air-eye" which prevents belt run-offs.

$108,000 SAVED IN ONE YEAR

with LORCO® vibratory processing at National Cash Register Company

It takes a heap of gears, pinions, levers, bearings, ratchets, contacts and other small parts to make a cash register, accounting machine or any of the other items of equipment manufactured at the National Cash Register Co. plant in Dayton, Ohio.

And it takes a heap of processing to deburr, radius, finish and otherwise prepare these parts for assembly into the finished product.

Even with Lorco vibratory finishing equipment 5 vibrators operate 24 hours a day to handle the 414 different parts now processed in Lorco equipment and to run tests on hundreds of other parts that are candidates for vibratory finishing.

But, compared to conventional barrel finishing and manual methods such as filing, grinding and brushing, Lorco vibratory finishing has effected a heap of savings—$108,000 in one year on 375 parts.

The other 39 parts which are processed in the vibrators receive the processing as an additional step to improve performance of the end product.

And this is an important part of the Lorco story—vibratory finishing gives you the finish you need. Thorough deburring, precise micro-inch finishing, accurate radiusing, close tolerances—all these you get with Lorco vibratory finishing, plus savings in time and in money.

Call on your Lorco engineer for the practical solution to finishing your "problem" parts. Or write today for details of Lorco experimental finishing service and media and compounds for precision barrel and vibratory finishing.

LORD CHEMICAL and EQUIPMENT DIVISION
OF WHEELABRATOR CORPORATION
2068-C South Queen Street York, Pennsylvania

Use postpaid card. Circle No. 252

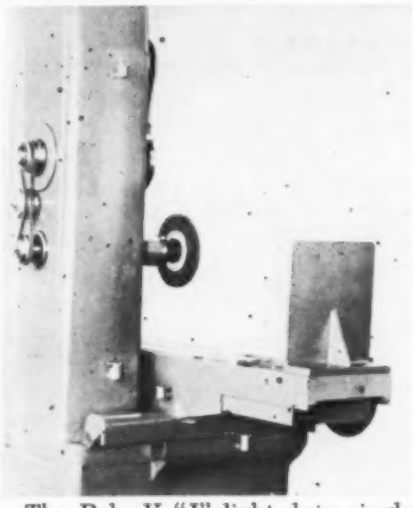
The unit is designed for positive belt-tracking under heavy work pressures. A special platen working table with work stop is available to facilitate flat grinding, and belt tension mechanism is spring controlled.

Unit comes in two models, for use with 6" or 12" abrasive belts. Minimum belt length is 114".

Murray Way Corp., P.O. Box 180, Birmingham, Mich.

Use postpaid card. Circle No. 60

LIGHT DUTY BELT DRIVE FOR SHORT CENTERS



The Poly-V "J" light duty single belt drive can operate on extremely short centers and over sheave diameters as small as .8" pd. It is available for applications ranging from 1/40 to 15 hp.

Advantages of Poly-V "J" drives include; silent and vibrationless operation; constant speed ratios; versatility in application to tandem, mule, ¼ turn, and serpentine drives; and durability at extremely high speeds.

With the regular Poly-V "L" and "M" sections, the Poly-V "J" replaces eight conventional V-belt sections.

Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N.J.

Use postpaid card. Circle No. 61

GRINDING and FINISHING

"Well, Joan, you said you wanted something different in a diamond engagement ring."

OLSON FILTRATION ENGINEERS *Cincinnati 12, Ohio*

OL-17-G

Send complete information on the new Olson "package" coolant filter.

*Name*_____

*Firm Name*_____

*Address*_____

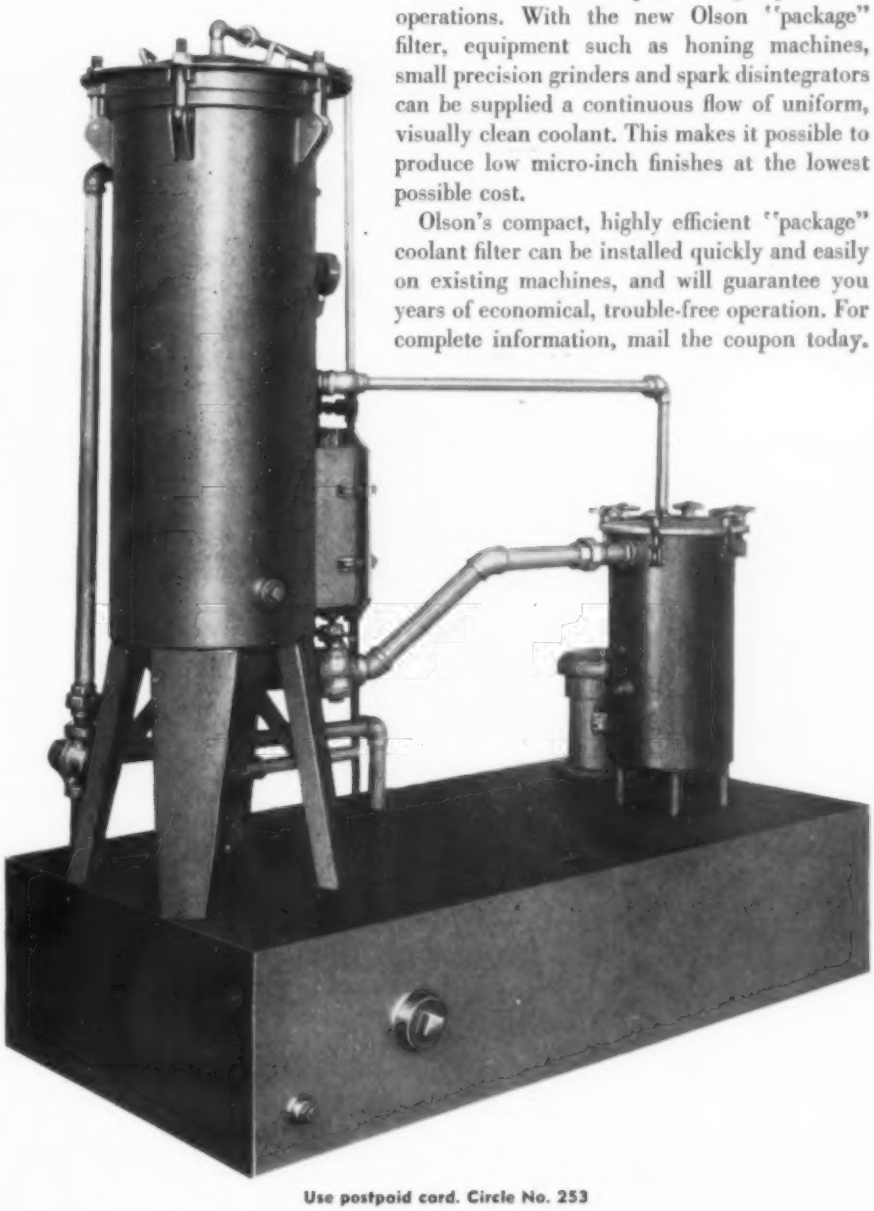
*City*_____ *Zone*____ *State*_____

Only from Olson . . .

"PACKAGE" COOLANT FILTERS FOR INDIVIDUAL MACHINES

Now you can lower your cost-per-part even on individual machines performing specialized operations. With the new Olson "package" filter, equipment such as honing machines, small precision grinders and spark disintegrators can be supplied a continuous flow of uniform, visually clean coolant. This makes it possible to produce low micro-inch finishes at the lowest possible cost.

Olson's compact, highly efficient "package" coolant filter can be installed quickly and easily on existing machines, and will guarantee you years of economical, trouble-free operation. For complete information, mail the coupon today.



Use postpoid card. Circle No. 253

ECONOMY MODEL DEBURRING UNIT ALSO SAVES SPACE

A new Almco deburring and finishing machine, Model DB-1616, is reported economical in both floor space and cost.

A two-compartment barrel with a capacity of 2 cu ft, it requires only 4.8 sq ft of floor space. A single-compartment barrel of the same capacity is available as optional equipment.

Barrels are lined with ¼" abrasive-resistant plastisol. Over-all size of the unit is 28" length, 25" width, and 50" height. Speed is variable from 13 to 39 rpm.

Almco, Precision Finishing, Queen Products Division, King-Seeley Corporation, Albert Lea, Minnesota.

Use postpaid card. Circle No. 62

NEW 7-INCH GRINDER

Advanced safety devices plus convenient handling of odd-shaped and long stock are features of a new 7", ½ hp grinder, available in bench and pedestal models. Among safety features are safety shields containing double-strength, shatter-proof glass.

Oval end bell hubs provide top-to-bottom thickness for rigidity and front-to-back thickness for easy work manipulation. The hubs are extra long to allow ample clearance for all stock.

Delta Power Tool Division, Rockwell Mfg. Co., 485 N. Lexington Ave., Pittsburgh 8, Pa.

Use postpaid card. Circle No. 63

COOLANT SAFE FOR NON-FERROUS METALS

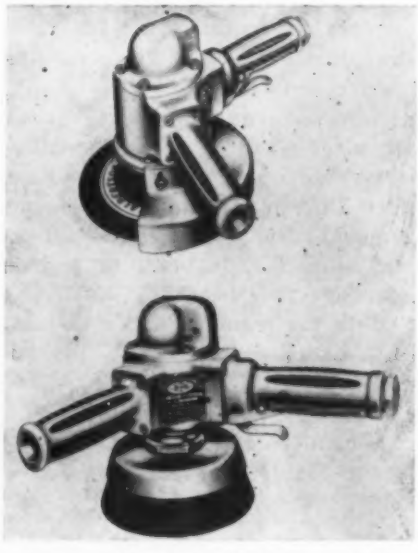
"Mill Stream," a new grinding coolant, is reported safe for use on non-ferrous metals. It can be used interchangeably for grinding ferrous and non-ferrous metals and will not damage valves or other fittings in the coolant system.

It cannot be used with magnesium and ductile iron. The product is also non-foaming even in high pressure, high capacity systems.

Service Products Division, Johnson's Wax, Racine, Wis.

Use postpaid card. Circle No. 64

VERTICAL AIR GRINDERS HAVE VARIETY OF USES

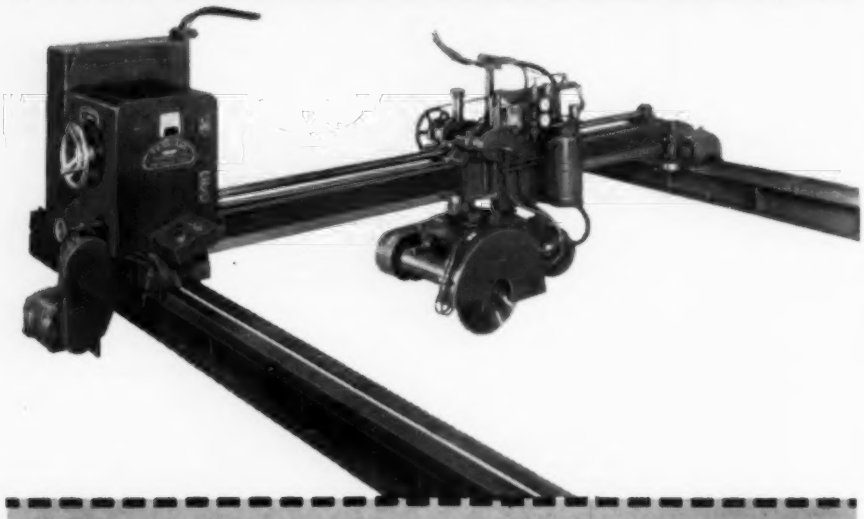


Two series of vertical air grinders can be operated as depressed center wheel grinders, flared cup wheel grinders, wire brush tools, or disc sanders.

The Model 505 is a regular duty 6,000 rpm 9" flared cup grinder and the 532 is a heavy duty 6,000 rpm 6" flared cup grinder.

Lever throttles which give momentary action and quick shutoff are standard. Housings are of magnesium. Newly designed air motors

ECONOMY SAW CUTS SHEET STOCK WITH 4-WAY ACTION



Accurate Squares up to 10 ft. Wide
Any Length — Cuts Metal or Plastics

The new Ty-Sa-Man Economy "111-CX" produces accurate square rectangles up to any length, and up to 10 feet wide, from stock up to two inches thick. Motor and arbor travel on a transverse rail, which moves along two side rails. This four-way movement, in combination with the 90 degree swivel head, permits trimming all four sides of a plate without moving it. Handling time is reduced to a minimum.

Ty-Sa-Man
SINCE 1885

Write for FREE BULLETIN
TY-SA-MAN Machine Co., Inc.,
1016 White Ave., Knoxville, Tenn.

Use postpaid card. Circle No. 254

provide air behind the vanes for quick starting.

The 505 is available with speeds of 7,000 6,000 or 4,500 rpm; the 532 in 6,000, 4,500, and 3,500 rpm.

Albertson & Co., Inc., Sioux City, Iowa.

Use postpaid card. Circle No. 65

LOW COST METAL CUT-OFF MACHINE

The GR series of cutting machines feature maximum cutting speeds with long blade life between resharpenings. They are designed for installations where low initial outlay and minimum maintenance costs are prime factors.

Powered by a full 10 hp, TEFC motor with high overload capacity, each unit is equipped with miter, notch, and coping attachments. Each job may be set up without holding or clamping. Cuts metals of every type—angle iron bar stock, tubing, pipes, and shapes. Units come in both traverse and chop stroke models.

Stone Machinery Company, Manlius, New York.

Use postpaid card. Circle No. 66

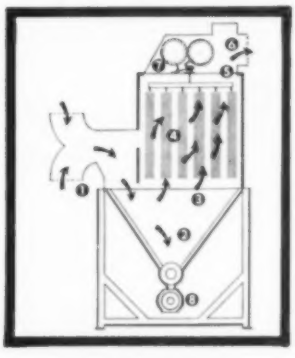
"Please, Eddie! If you want that hunting knife ground, hand it to me *personally*."

NEW TORIT DUST COLLECTOR IS AUTOMATIC!

Save real dollars with the benefits from this *automatic* dust collector. No more interruptions on production lines! Maintenance problems are practically eliminated. This all new continuously cycling TORIT dust collector *automatically* cleans your air and *automatically* shakes its own filters and blows them clean with reverse air flow. Collected material is emptied *automatically*.

OTHER EXCLUSIVE TORIT BENEFITS

- automatic filter-shaker mechanism is simple, maintenance-free
- different dusts may be collected separately
- highest air-to-cloth ratios (from 5 to 25:1) and longer filter life
- only ¾ H.P. required for fully automatic operation
- polished ⅛" aluminum construction for minimum floor loading
- modular design—5' wide x 4'-8" long (for two sections) x 15'-6" high—saves space, lends ease and versatility to installation. Use up to 12 modular sections for each application! No limit to CFM capacity!



AUTOMATIC AND EFFICIENT, the filtering cycle of each TORIT section is self-timing. A separate blower on the clean air side keeps collector under suction. Then, (1) dust-laden air is taken into manifold; (2) coarse dust drops out; (3) fine dust is carried to filtering sections; (4) filter tubes catch dust on inside surfaces; (5) clean air emerges from filters; (6) to suction fan and clean air discharge outlet. (7) *Automatic* shaking and reverse air filter cleaning mechanism. (8) Conveyor *automatically* removes and discharges accumulated dust.

Have a cleaner plant, better morale and high productivity with lowest maintenance costs. Special design services are available based on your individual requirements. Write today for literature.

TORIT MANUFACTURING COMPANY

Automatic Collector Division, 1133 Rankin St., St. Paul 16, Minn., Dept. 534

Use postpaid card. Circle No. 255

CUTTING FLUID HELPS MAINTAIN TOLERANCES

A heavy duty emulsifying cutting fluid, Gulfcut H.D. Soluble Oil, contains anti-weld properties which help maintain tolerances when the fluid is used as a coolant. It combines the desired lubricity and anti-weld properties of compounded cutting oils with the cooling properties of emulsions in general. It is effectively inhibited against rust and corrosion.

Gulf Oil Corp., P.O. Box 1166, Pittsburgh 30, Pa.

Use postpaid card. Circle No. 67

DRUM DUST STORAGE

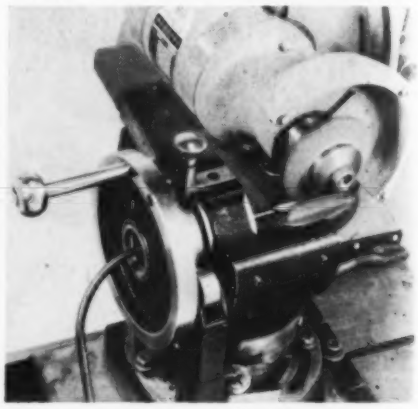
The new Aget drum dust series provides dust discharge directly into 55-gallon drums attached to collectors through an especially designed lid. The lid attaches to stand and drums by clamp. A sponge rubber gasket forms a tight seal between the lid and the drum edge. Both single and dual drum systems are offered.

Aget Mfg. Co., Adrian, Mich.

Use postpaid card. Circle No. 68

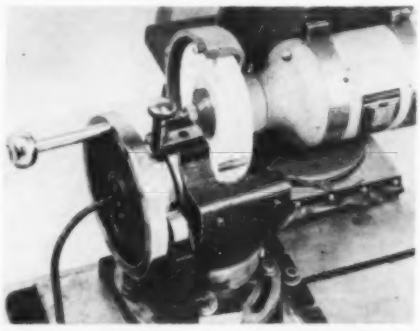
BENT AND HOOK SHANK TAP GRINDING FIXTURE

Designed for faster, more accurate sharpening of bent and hook shank taps, a specialized tap grinding fixture completely eliminates the necessity of removing nib type tabs from the shank for flute grinding or relieving of chamfers.



Taps are inserted through the collet from the rear. The fixture also eliminates resoldering of tap to shank.

The unit is hand-rotated and can be mounted on any conventional cutter grinder table. It is furnished standard with cam and index plate for three flute taps. Collets are available in all sizes of taps.



R-O Mfg. Co., Madison Heights, Michigan.

Use postpaid card. Circle No. 69

GRIND AT 90° ANGLE WITHOUT SPACER BLOCKS

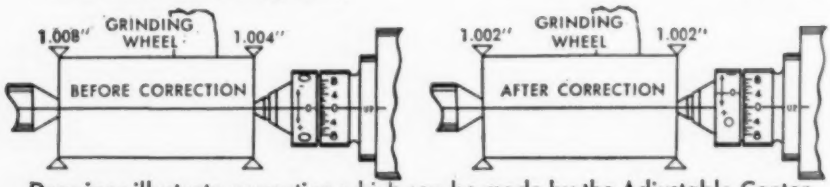
A magnetic chuck, with two holding surfaces, permits grinding at a 90° angle without the use of spacer blocks.

A special power supply produces a surge current which saturates both pole surfaces and generates a magnetic force powerful enough to hold small pieces of high carbon steel.

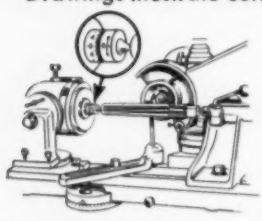
NEW . . . *fast, easy* CENTER ALIGNMENT for GRINDERS

Center being used on grinder

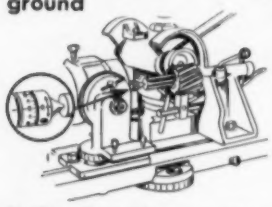
The Enco Micro-Set® Adjustable Center



Drawings illustrate correction which can be made by the Adjustable Center



Taper reamer being ground



Helical milling cutter being reground

- Permits TRUE work alignment from tailstock or headstock on: cylindrical grinders, cutter grinders, gear shavers, lathes and tracer attachments.
- Saves one half the setup time.
- Ends hit or miss table adjustments to obtain precise alignment.
- An inexperienced operator can get a precise alignment—easily—in seconds.
- Quickly pays for itself in time and scrap savings.

MORSE TAPER
No. 2—$49.50, No. 3—$61.50, No. 4—$76.00.

BROWN & SHARPE
No. 6, 7—$53.00, No. 8, 9—$65.00, No. 10, 11—$85.00.

JARNO
No. 6, 7—$53.00, No. 8, 9—$65.00, No. 10, 11, 12—$85.00.

STRAIGHT SHANK
¾"—$56.00, 1"—$68.00, 1¼", 1½"—$80.00.

We also manufacture Precision Lathe Turrets and Tiny-Titan Magnet Base Holders.

Enco MANUFACTURING CO. Dept. 851, 4520 W. Fullerton Ave., Chicago 39, Ill.

Write for catalog and nearest distributor.

SEE US AT BOOTH 3834 ASTME SHOW, NEW YORK COLISEUM

Use postpaid card. Circle No. 256

Active surface of the chuck is 2" x 5". Poles of alternate polarity are ¼" apart. The chucks sell for $135. The power supply costs $55.

Stratocon Corporation, Morristown Airport, Box 10, Morristown, New York.

Use postpaid card. Circle No. 70

ONE SETTING GROOVE GAGING

Groove widths and locations can be checked with one setting of Reli-A-Gage Model B-1400. The gage has a hardened footed rod for checking standard "O" ring groove widths and locations.

It is equipped with an .0005 indicator, case, wrenches, one footed rod and one straight rod.

Reli-A-Chek Corp., 2614 Industrial Way, Santa Maria Airport, Santa Maria, Calif.

Use postpaid card. Circle No. 71

NEW METER FEATURES TAMPER-PROOF RESET

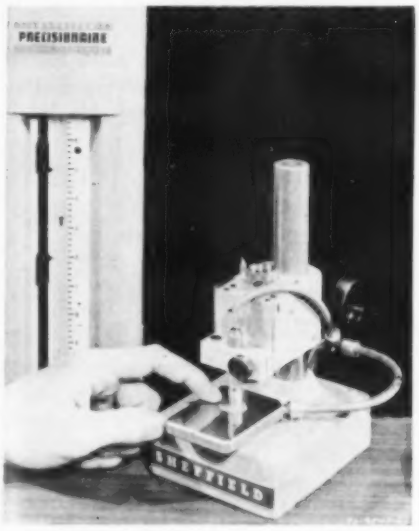
A new machine-hours-meter features a tamper-proof reset that moves all five digits at one time ahead of zero. Machine hours are registered in tenths.

The meter may be reset at the end of each shift, preventing the operator from comparing with the previous shift worker's time.

Ameresco, Inc., 7 Center Avenue, Little Falls, New Jersey.

Use postpaid card. Circle No. 72

MEASURES WITHOUT GAGE POINT PRESSURE



Designed to measure the thickness of thin, fragile materials, the Precisionaire® non-contact thickness gage literally floats the part in air during gaging.

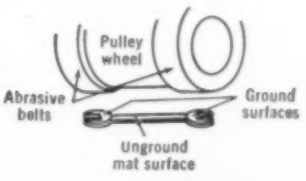
The pressure-free gaging operation is obtained by means of opposed airjets. The air flowing out of the jet calipers gives accurate,

DIFFICULT TO GRIND SURFACES-
NOW A CONTROLLABLE AUTOMATIC OPERATION
THE LOUNGWAY Rise and Fall ABRASIVE BELT GRINDER now has made it possible to replace hand grinding many surfaces on hardware items.

A simple holding fixture made rough and finish grinding of this Plane Lever Cap a completely controllable operation. Automatic grinding improved finish, product quality, and increased production substantially.

Formerly a hand grinding operation, many surfaces of this Hammer Head now have uniform, controlled ground areas in spite of this product's unusual contours.

This open end wrench is ground by using two separate abrasive belts on the same spindle, each grinding a face on an end of the wrench in the same pass. The number of wrenches ground in one cycle depends on wrench size, production requirements, and fixture capacity. Wider tables than standard can be supplied for grinding longer wrenches. On these wider tables, the travel is greater, so the capacity also is enlarged.



We invite you to write for Catalog No. 100 now to learn more about this unique cost and time-saving LOUNGWAY Grinder.

THE EASTERN MACHINE SCREW CORPORATION

61 Barclay St. • New Haven 6, Conn. • STate 7-5724

Use postpaid card. Circle No. 257

repeatable thickness indication by the position of the float on the gage column.

The gage head has both fine and coarse adjustments. It is adjustable from .001 to 4". The gage is calibrated with minimum and maximum size parts. No masters are required.

The Sheffield Corp., Dayton 1, O.

Use postpaid card. Circle No. 73

NATURAL DIAMOND GRIT HAS IMPROVED QUALITY

The development of a new type of natural diamond grit has been announced by Diamond Tool Research Co. Full-scale production of these grits, called Pressure-Tested Diamond Grits and Micron Sized Powders is now underway.

The new diamond abrasive is unlike others in that the diamonds have been quality pre-tested in the method of production. The diamond structures are extremely blocky and because of their uniformity, close grading is possible.

Diamond Tool Research Co., Inc., 580 Fifth Avenue, New York 36, N.Y.

Use postpaid card. Circle No. 74

MICHIGAN TOOL OFFERS 7" ROTARY INDEXING TABLE

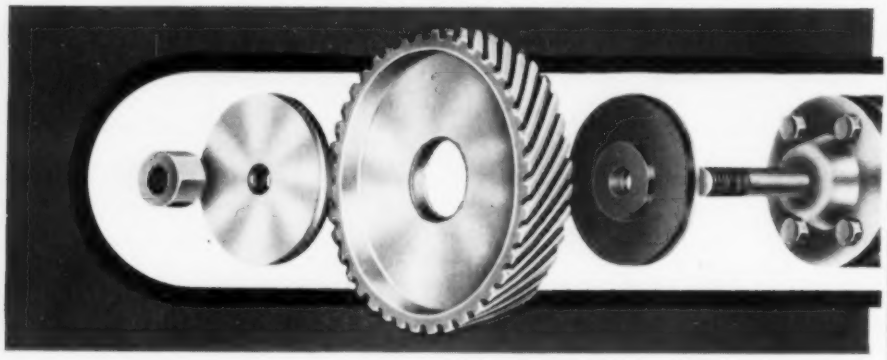
Michigan Tool Company has introduced a new 7" diameter Milichex rotary indexing table which provides whole-degree angular indexing to an accuracy within ½ second of arc.

As a rotary indexing table it can be used for machining or inspecting. Sealed design permits use with coolants or lubricants. The top is flat and parallel within .000050 and has radially dispersed holes for easy attachment of work or fixtures.

Michigan Tool Co., 7171 East McNichols Road, Detroit 12, Mich.

Use postpaid card. Circle No. 75

NEW! SELF ALIGNING LOW COST



Cosmo Contact Wheels WITH COSMO-ALIGNER FLANGES

- ELIMINATES VIBRATION
- QUICK INSTALLATION
- FITS ALL WORN SHAFTS
- INCREASES PRODUCTION
- MOST ECONOMICAL

Your present equipment will operate like new with these self-aligning, low cost, Cosmo-Aligner shaft flanges. They operate with smooth perfect balance on all types of worn shafts. Made of durable rubber cushions, vulcanized to the face of ⅛-inch steel discs. Eliminating vibration will increase the life of your belts and bearings, as well as produce a finer finish for your end product. Call or write today for further information.

R-100 AVAILABLE WHEEL SIZES
Width of Face

Dia.	Flange	1"	1½"	2"	2½"	3"	3½"	4"
6"								
7"								
8"	SHADED AREA INDICATES							
10"	SIZES AVAILABLE							
12"								
14"								
16"								

**Flanges should be ordered with set of wheels.*

RECOMMENDED USES FOR R-100 COSMO WHEELS

SIZES, DUROS, and SERRATIONS TO MEET EVERY GRINDING and FINISHING NEED

R-100-PF	R-100-STD	R-100-SCOOP	R-100-S9	R-100-E
Soft duros for fine finishing in flat work or mild contour work.	1 to 1 land to groove ratio. General purpose wheel used in all duros.	1 to 3 land to groove ratio. Provides faster cutting and more aggressive stock removal.	1 to 3 land to groove ratio. Deeper serrations, increased flexibility, conforms best to unusual contours.	This is a slotted expanding wheel for bands only.

MANUFACTURED BY CHICAGO RUBBER CO., INC. FOR

Cosmo-Wheels, Inc. 1019 FULTON STREET CHICAGO 7, ILLINOIS

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"Why yes, I did design grinding wheels. How did you know?"

GRINDER MAINTAINS PRECISE SQUARENESS CONTROL

The Kar-Ry precision belt grinder maintains precise squareness control while concurrently generating longitudinal grind line finishes.

The unit utilizes platens which correspond to the size belt most suitable for the job. The platens are rigid and withstand deflection in all normal use. They come in flat or curved faces.

Finish is obtained through use of a variety of belts. Worn belts may be saved for use when low rms readings are desired.

Special advantages of the unit in punch and die production are: reduction of galling; elimination of surface indentations; reduction of "down time"; less frequent tool failure; longitudinal grind line finishing of punches and dies.

Industrial Machines and Services, Inc., New Britain, Conn.

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PRECISION SPACER

A precision spacer for use on grinding, milling, drilling, and other machining operations features a quick-action actuating lever and a choice of seven different divisions in the standard model. Divisional accuracies of 40 seconds or better are obtainable. Platen models are 9" in diameter. An 8" chuck is furnished.

Universal Vise and Tool Co., Parma, Michigan.

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STANDARD AIR GAGES

Standard Gage Company's two new models, No. 120 and No. 240 air gaging stands and control units, have an adjustable magnification from 35:1 to 28,000:1, with a choice of 26 stock dials.

Standard Gage Co., Inc., Poughkeepsie, N.Y.

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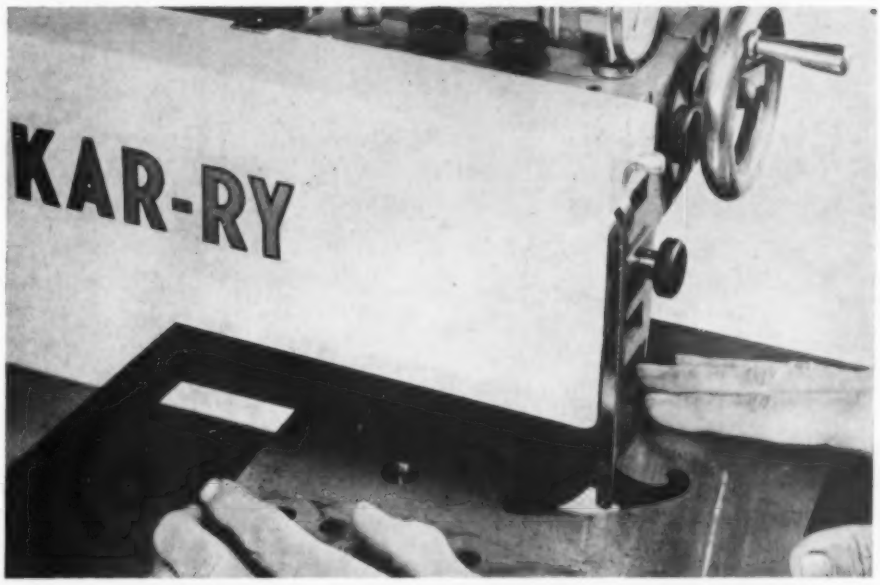
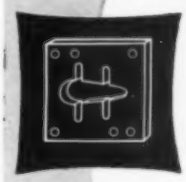
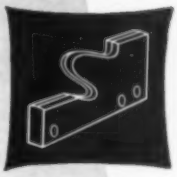


BOYAR-SCHULTZ
PROFILE GRINDERS . . .
FOR GRINDING and FITTING
DIFFICULT CONTOURS





Boyar-Schultz Profile Grinders have long been regarded as necessary tools in Tool and Die Shops where daily operations require grinding and fitting odd and irregular shapes and contours. With Boyar-Schultz Profile Grinders this work is performed much better . . . and at a saving.

AVAILABLE IN 3 SIZES

No. 1 —Wheel Sizes, ⅛" to ¾", Spindle Speed, 20,000 R.P.M. Vertical oscillations, 100 per minute.

No. 2 —Wheel Sizes, ¼" to 3", Single or Dual Spindle. Speed, 10,000 R.P.M. Vertical oscillations, 3/16" 100 per minute.

No. 2-6"—Wheel size up to 6" diameter. Speed, approx. 3450 R.P.M. Vertical oscillations 1/16" 100 per minute.

WRITE FOR DESCRIPTIVE LITERATURE

No. 2-6" PROFILE GRINDER

No. 1 PROFILE GRINDER

Boyar-Schultz CORPORATION
2002 SOUTH 25th AVENUE
BROADVIEW, ILLINOIS

No. 2 DUAL SPINDLE PROFILE GRINDER

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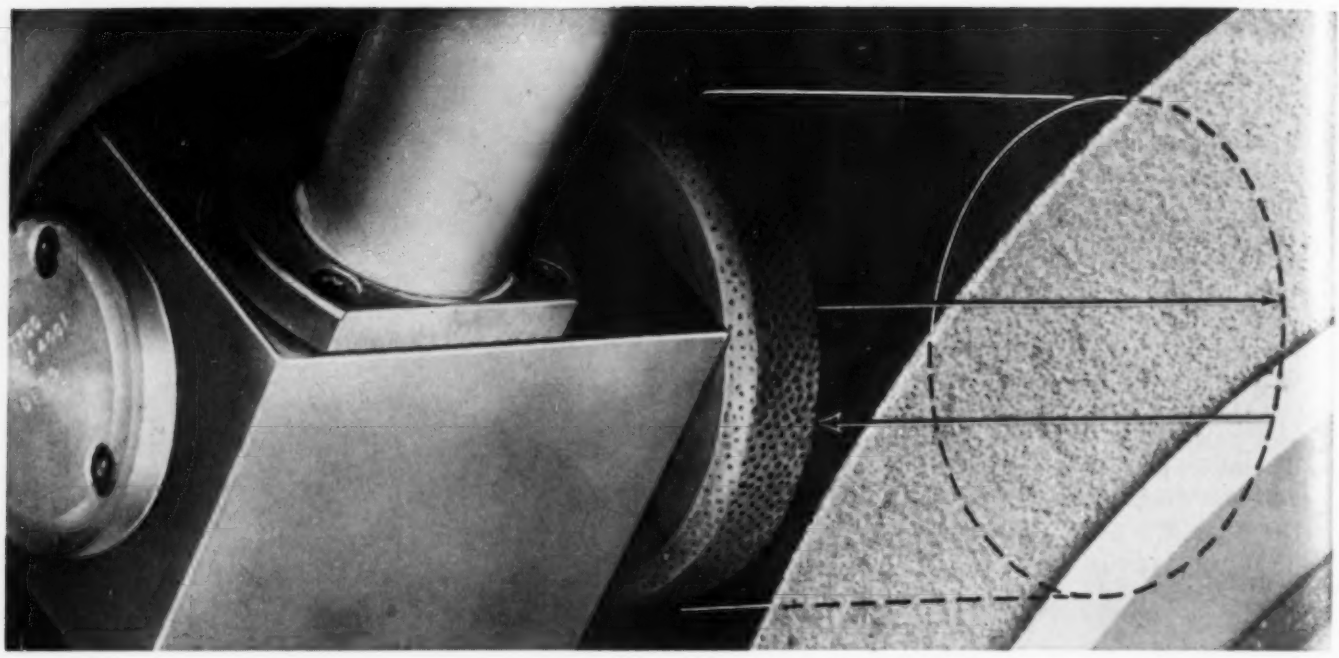

NEW TRU-GRIT® ROTARY DIAMOND DRESSING TRAVERSE WHEEL controls finish, ends tool-change downtime loss, develops taper-free grinding face, holds accuracy, cuts production costs.

The new Tru-Grit Rotary Traverse Dressing Wheel is a straight-faced, power-driven wheel with hundreds of high-quality, small, selected diamonds hand-set in an overlapping cutting pattern.

Ideal for use on straight-faced grinding wheels, it presents to the grinding face, not one single diamond point, but hundreds of small, sharp, fast-cutting diamond points which generate uniform fracture of the grinding face and consequent uniformity of finish on the workpiece, impractical by other methods.

This dress, performed in a single, swift pass at regular intervals with minimum infeed, imposes negligible wear on dressing wheel and grinding wheel, yet keeps the grinding face uniformly sharp and free-cutting.

Thus, since there is virtually no change in the cutting face of the wheel from one grind to the next, workpiece finish is maintained at controlled uniformity.

Grinding face need never become loaded or dulled to the point where finish falls below specification. Specified finish can be maintained with minimum operator attention. Where desirable, the entire application can be automated.

Available finishes are within the 30-55 rms range. Taper-free straight surface is developed within .0002″ and geometrical roundness of workpiece diameter within .0002″.

There is no recurrent downtime for tool set-up. A typical Tru-Grit Rotary, Power Driven Traverse Wheel set-up on a grinder using a 24″ x $3\frac{5}{16}$″, 60-grain wheel, developing an oil-retaining finish within 30-55 rms, remained in original setting until replaced with a new one after it had performed 10,930 dressings and the wheel had produced 1,366,512 pieces. Obviously, savings were substantial.

The Tru-Grit Diamond Dressing Traverse Wheel may hold equally important cost-cutting potential for you. We invite you to write us about possible applications.

Finer finishes in the 12-18 rms range are available by using the Tru-Grit Contact-driven Rotary Wheel which is powered by contact with the grinding wheel.

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WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.
575 Langlois Ave., Windsor, Ontario

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DIAMOND DRILLS for Mining and Oil Field use • **DIAMOND DRILLS, SAWS** and **PORTABLE MACHINES** for Masonry Drilling

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AWARD AND PLAQUE PRESENTED TO FIRST PROGRAM WINNER

Robert F. Deane (center), Deane Carbide Products Co., Trevose, Pa., receives a cash award and commemorative plaque from W. G. Pinkstone (right), president of the Grinding Wheel Institute. At left is M. M. Patterson, editor of GRINDING AND FINISHING Magazine.

W. G. Pinkstone, president of the Grinding Wheel Institute, said, "You are now an author!" as he presented Robert F. Deane the first award to be presented in the award program, "Your Case for Grinding." At a luncheon meeting in Philadelphia, Deane was presented with a $50 check from the GWI and a plaque of the article from GRINDING and FINISHING. Expressions of congratulations were also extended by D. S. Saurman, public relations chairman of GWI and M. M. Patterson, editor of GRINDING and FINISHING.

The award was made as the result of Deane's presenting information on a diamond wheel grinding operation on carbide parts. This information includes a photo of the operation. The story was run in the March issue of GRINDING and FINISHING under the headline of "70% Increase in Efficiency Results from Wheel Evaluation."

As Pinkstone presented the award he stated, "You have submitted the first article accepted by the judges of a nationwide program, sponsored by GRINDING and FINISHING and the Grinding Wheel Institute.

"This program, created by the sponsors to get stories of successful new applications of Bonded Abrasives, will, we hope, bring forth many interesting developments wherein the use of grinding wheels has resulted in outstanding benefits to the user.

"It is particularly interesting to note that this first article to be accepted for publication, deals with the use of one of our newest types of abrasives—Man-Made diamond—bonded into a wheel."

This first presentation marks the beginning of what appears to be a real tool in the development of manufacturing of this country. Robert Deane is not a writer, but is the president of a successful manufacturing firm. The submission of the material for this program has established Deane as a cut above the average in that he has contributed to the knowledge of this country. The awards are but a recognition that the sponsors of the program honor this contribution.

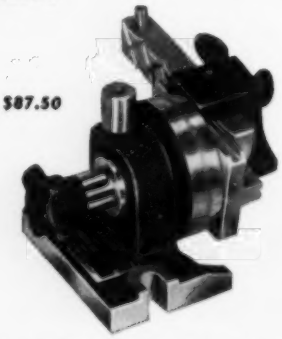
The sponsors want all to share, not only in the value of the material

continued

Angle Tangent to Radius WHEEL DRESSING *Simplified* WITH ROTHFUSS TOOLS

THE G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on all wheels up to 10" and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. *Price $80.50*

Price $87.50



THE G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up jobs to be milled, drilled, tapped on any desired angle.

FREE **STORAGE CASE** of light-weight steel, with a hinged top, heavy duty latch and a blocked interior to insure the safety of the dressers when carried.

OUR FIXTURES will dress most radii and angles tangent each other, similar to those shown below.

All for only **$149.50** *(including case and both tools with diamonds)*

Distributorship available in select territories

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presented, but also in the recognition of development. All users of abrasives are eligible for the award program. Additional information can be obtained from your local abrasive salesman, or by writing the editor of GRINDING and FINISHING, Wheaton, Illinois.

SUPER-STRENGTH BOND PERMITS FASTER POLISHING

A super-strength bond between the rubber "tire" and the metal hub of polishing and grinding contact wheels now prevents explosive failures at operating speeds to 19,000 RPM, permitting faster polishing and superior surface finishes.

The bond, composed of Chemlock® Adhesives 220 and 203, is manufactured by Hughson Chemical Co., of Erie, Pa. The two products form an adhesive system which bonds uncured elastomers to any metal and produces a rubber-tearing bond. One coat of 203 is used as a primer and one coat of 220 as adhesive for both stainless or aluminum hubs.

The bond has been successfully used by the Chicago Rubber Co., Inc., of Waukegan, Ill., producer of rubber contact wheels and rolls.

3M BUILDS COATED ABRASIVE PLANT IN AUSTRALIA

Plans for the construction of a coated abrasive plant in Australia were announced recently by Minnesota Mining & Manufacturing Co.

The 3M Company revealed that its Australian subsidiary will soon begin construction on the new plant, to be located at the site of the present 3M Australia plant at St. Mary's, New South Wales. It is expected the plant, which will have about 40,000 square feet of floor space will be in production early in 1962.

The present production facilities of 3M Australia occupy nearly 90,000 square feet and are devoted to manufacturing and converting operations for a wide variety of 3M products. The new abrasives plant reflects the continuing sales growth of 3M's manufacturing subsidiaries abroad, which have been an important factor in the increased sales and earnings in 1960.

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PUMPING SYSTEMS

Thousands of these popular GRAYMILLS bucket pumps are now in use. The Model SG1-4-25 gear type pump in a 5 gallon round container can be used to pump coolants and light oils. Easily installed in just a few minutes, it's used on single and double spindle drill presses, small lathes, hand screw machines and small spot welders. 1/25 HP motor delivers 1 GPM at a max. pressure of 22 PSI. You get top quality and top performance at a *low price* of only $63. Buy it or other GRAYMILLS' pumping systems from your industrial distributor.

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- Water-Proof Abrasive Papers
- Resinoid Grinding Wheels

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PRESIDENT KENNEDY NAMES IMIRIE TO AIR FORCE POST

The abrasives industry can take particular pride in a recent appointment made by President John F. Kennedy.

Joseph S. Imirie, former vice president of Carborundum Company and general manager of its Electro Minerals Division, has been appointed Assistant Secretary of the U.S. Air Force for Materiel.

In his new post, Imirie is in charge of the Air Force's annual $10 million procurement program. He is also responsible for the Air Forces' $13 billion inventory.

WALKER SUCCEEDS IMIRIE AT CARBORUNDUM

Bruce Walker, former manager of the Technical Branch of Carborundum Company's Electro Minerals Division, has succeeded Joseph M. Imirie as general manager of the division.

Succeeding Walker as manager of the Technical Branch is Dr. Donald

continued

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DRESS ABRASIVE BELTS FOR 30% LONGER LIFE

Unique Desmond Beltbrasive® dressers increase abrasive belt life 30% or more . . . give you "new" surface efficiency throughout belt life. Patented dresser quickly cleans out loaded belts, drums or discs on metal, wood or plastic jobs. One light pass when belt begins to load is all you need. Typical model costs less than $7. Ask your Desmond distributor.

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Desmond

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Clearly explains modern metal cutting -- principles, mechanics, machining methods

In this book you'll find a wealth of information to help you specify or perform machining operations for higher production and lower costs. Presented here are important facts on what happens at and near the edge of the cutting tool where the chip is formed and the new surface created. You get detailed coverage of the cutting tool, the workpiece, the chip, and the cutting fluid.
In addition, the book thoroughly discusses such topics as the existence of the shear plane in metal cutting, functions of cutting fluids, and types of cutting tool materials. It helps you gain a sound working knowledge of such practical factors as lubrication, friction, and wear of the cutting tool as they affect the metal cutting process. Important advances in the field are covered—including the effect of temperature on wear, location of the shear plane, and newer tool materials.

THEORY OF METAL CUTTING

By PAUL H. BLACK

Professor of Mechanical Engineering, Ohio University

204 pages, 6 x 9, 105 illustrations, $7.50

With the helpful facts on the metal cutting process presented in this book you can more readily achieve better surface finish, rapid removal of metal, and effective machining practice. You are given information on the cutting tool, the workpiece, the chip, and the cutting fluid to help you choose an economical and efficient metal cutting process.
Clearly outlined in the book are established basic principles of both two- and three-dimensional cutting, and important features in machining operations of economic importance to the user of machine tools.
This practical guide provides you with data on surface irregularities and damage . . . criteria for evaluating machinability . . . the advantages of numerical control in machining . . . methods of treating surfaces of high-speed steel tools to reduce friction . . . and much more. Consult this book for clear explanations of the principles, mechanics, economics, machining methods of modern metal cutting.

Gives vital facts on . . .

structure and strength of materials • mechanics of plastic flow and fracture • mechanics of metals cutting • the shear plane • force relations • basic principles of friction, lubrication, and wear functions of the cutting fluid • tool materials and types of failure • various types of wear • tool life as it affects the economics of the cutting operation • methods for measuring tool life • mechanics of grinding metal • types of grinding wheels • numerical control machining • conditions affecting cost of machining • experimental machining methods.

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W. Gillmore, former manager of the branch's development department.

Walker, a native of Canada, joined the Carborundum staff in 1942 as technical control laboratory assistant. He was made manager of the Technical Branch in 1959.

GRINDING WHEEL INSTITUTE PICKS 1961 COMMITTEES

At a meeting held in Detroit, Michigan, the Grinding Wheel Institute named the following as chairmen of standing committees:

Research Projects: W. L. Kenagy, vice president, Simonds Abrasive Co., Philadelphia, Pennsylvania.

Public Relations: D. S. Saurman, advertising manager, Simonds Co.

Safety: F. C. Stockinger, sales manager, Bay State Abrasive Products Co., Westboro, Mass.

Technical: H. D. MacMaster, plant manager, Keystone Abrasive Wheel Co., Carnegie, Pennsylvania.

Standardization: H. J. Jeffers, sales manager, Bonded Abrasive Division, The Carborundum Co., Niagara Falls, New York.

Packaging: H. D. Leitten, superintendent, grinding wheel division, Electro Refractories & Abrasives Corp., Buffalo, New York.

Grinding Wheels

Wanted Exclusive distributorship for greater New York Metropolitan Area on a complete line of resin and vitrified grinding wheels Have experience and and large following.

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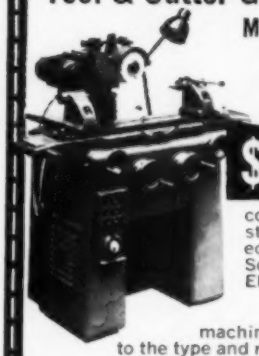
c/o Grinding & Finishing
Wheaton, Illinois

ELGIN Ultra-Universal Tool & Cutter GRINDER

Model AUL500
8" x 20" cc Capacity



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complete with standard equipment incl. Square "D" Electrics

A jewel of a machine — no limit to the type and range of tools it can handle. With patented 6-way swivelling head and double-swivelling table.

IMMEDIATE DELIVERY FROM STOCK!

For Detailed Brochure — Clip This Ad, Staple to Your Letterhead and Mail to S & S Machinery Company, 140 53rd St., B'klyn 32, N. Y.

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GRINDING WHEEL INDUSTRY SEES FUTURE GROWTH

Several new developments and trends in grinding practice were disclosed at the 4th Annual Mid-Winter Conference of the Grinding Wheel Institute held in February at Buffalo, N.Y. The new developments in practices occurring in industry indicate wider use and growth of grinding wheels as production tools.

Among these is the trend to higher operating speeds in both precision and automatic grinding operations under properly controlled conditions. The ability of modern grinding wheels and grinding machines to produce tolerances and finishes measured in microinches is another significant development.

Also considered important are the improvements in crush dressing techniques in crush dress grinding on certain classes of precision and form grinding and the capabilities of the grinding wheel to work many materials that cannot be worked by other means, including the new exotic or space age materials.

According to the Grinding Wheel Institute, the importance of wheels becomes important when it is realized that much of the nation's industrial production capability depends on critical tools like grinding wheels, which shape, form, and finish other production tools, parts, and materials.

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Prominent manufacturer located in New York City seeks qualified individual thoroughly experienced in fabrication of resin bonded diamond wheels.
Position can either be permanent or on consulting basis. Salary open. Attractive position.

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Industrial Diamond Products

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Many choice territories still open throughout the United States. Attractive discounts, commissions and selling aids are offered, to those with experience.

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c/o Hitchcock's Grinding and Finishing
Wheaton, Illinois

Changing Faces . . .

Thomas W. Clark has been named president and general manager of the Threadwell Tap & Die Co., a subsidiary of the Sheffield Corp. of Dayton, Ohio.

Clark has been a Threadwell vice president and member of the board for the past three years. He replaced Roy Heldenbrand, who has been promoted to president in charge of operations at Sheffield.

T. W. Clark

The board of directors of the F. Jos. Lamb Co., Detroit, Mich., has announced the election of John K. Rye as president.

Rye came to the company in 1951 as assistant general manager. Before then he was administrative and technical assistant to the general manufacturing manager in the Lincoln-Mercury Division of the Ford Motor Co.

John K. Rye

Holmes H. Whitmore has been named president and chief executive officer of Jones & Lamson Machine Company, Springfield, Vermont. He has been with the company since 1941.

Harry L. Hildebrand has been appointed general manager of Dytronics, Inc., Rochester, Mich. In his new position he will assume full responsibility for the over-all operations of the company. Hildebrand had been manager of process and design engineering for Taylor Fibre Company's plants at Norristown, Pa., and LaVerne, Calif.

Harry L. Hildebrand

Russell P. Hook has been appointed Chief Engineer of Norton Company's Machine Tool Division. He succeeds Herbert A. Silven who retired from the post. Stewart S. Mader succeeds Hook as machine development engineer. Hook joined the division's experimental department in 1932 and was appointed machine development engineer in 1954.

Rudolph V. Nadeau has been named the new sales and office manager for B.I.C. Bristol Instrument Gears, Inc., 64 Central St., Forestville, Conn. He was previously sales manager for the Allison-Baldwin Advertising firm in West Hartford, Conn. In his new position, Nadeau will be the procurer of new sales in the screw machine, assembly, gear and cam division of B.I.C.

Russell P. Hook

Anything new in Diamond Wheels?

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INCREASE WHEEL LIFE 50%

You can remove more stock, faster, with less wheel wear, when you use the new PRECISION "BH" Resinoid Bonded Tool and Cutter Diamond Wheels.

This is another PRECISION first in industry. By radically new production methods, the diamond cutting particles are attached to the resinoid bond. It wets and holds the diamonds. Users report up to 50% increased wheel life.

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DIAMOND POWDER SALVAGE SERVICES

Industrial Diamond Powders, Inc. is the pioneer in diamond salvage, with years of experience in this exacting business.

Now, IDP is pleased to announce a new and improved system of diamond salvaging. This new method, used by IDP alone, was developed during recent years in conjunction with Battelle Memorial Institute of Ohio, a noted research institution. The new system gives lower salvage costs, higher yields, and eliminates use of toxic and hazardous heavy liquids still being used by most diamond reclaimers. IDP's Warren Danforth, Chemical Engineer of long experience in diamond technology, and George Danforth, Chemist, are now using this new salvage system to give clients more dependable and higher yields of Natural or Man-made diamonds.

If you use many diamond grinding wheels per year, investigate IDP's salvage services. Either ship a trial lot of your grindings, or send a 2-pound sample for analysis. IDP buys your diamonds or returns them graded for your further use. Your material is fully insured as soon as it reaches IDP's modern plant. IDP is capable of processing sludge from a few pounds to tons in size. IDP reclaims diamonds from sludges, used diamond wheels, lapping wastes, and other materials. Customers who use graded diamond powders generally get sizes they use—no need to stock sizes which must eventually be disposed of.

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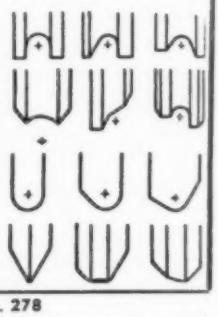

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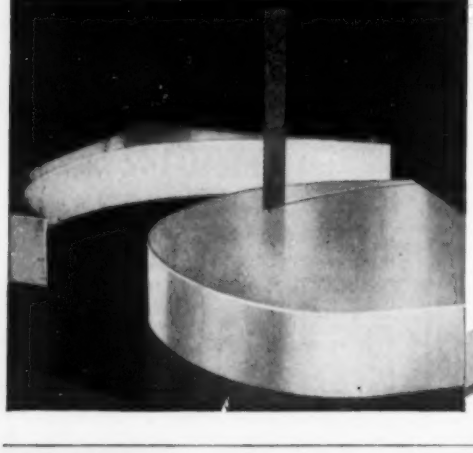
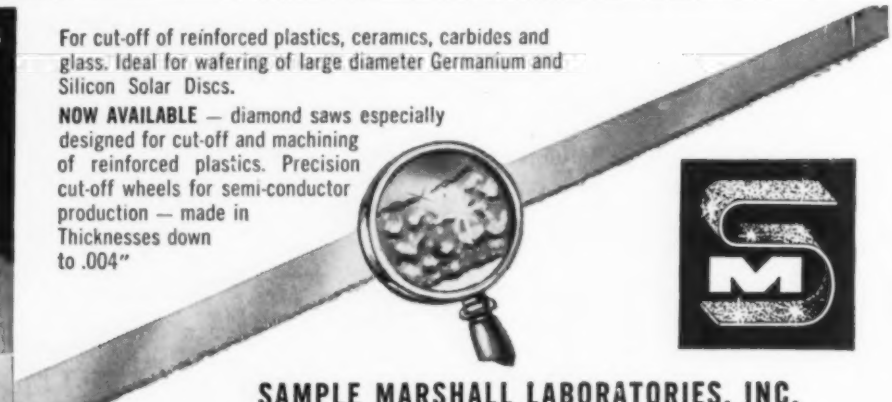
Diamond Coated Band Saw Blades



For cut-off of reinforced plastics, ceramics, carbides and glass. Ideal for wafering of large diameter Germanium and Silicon Solar Discs.

NOW AVAILABLE — diamond saws especially designed for cut-off and machining of reinforced plastics. Precision cut-off wheels for semi-conductor production — made in Thicknesses down to .004"



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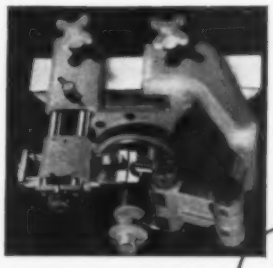

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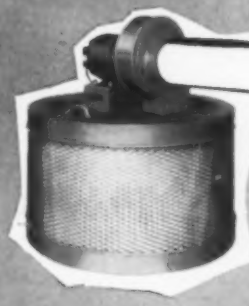

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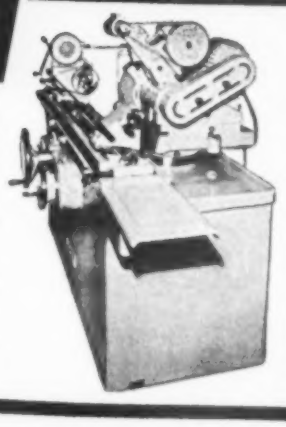

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Abrasive Finishing in the Space Age

Missile makers specify not only acceptance requirements, but also methods and equipment. This is a case study of finishing of one small "space age" component.

Flap-Type Wheel Goes Centerless

Using a flap-type coated abrasive wheel on a centerless grinder saved $1,000 a month last year on a minor operation at International Harvester's Indianapolis plant.

U.S. vs. Germany: Mechanical Bumper Finishing

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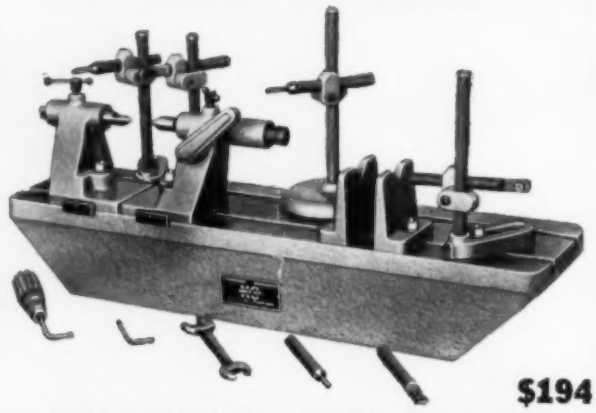

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The K. O. Lee Bench Center and Surface Plate provides an accurate means for inspecting all types of work. Work pieces can be mounted between centers, in V-rests or on precision ground surface plate. Surface plate tolerance for flatness is .0002" per foot. Runout is shown on dial indicator as work is rotated by hand. Side runout or camming action can be checked with second indicator.

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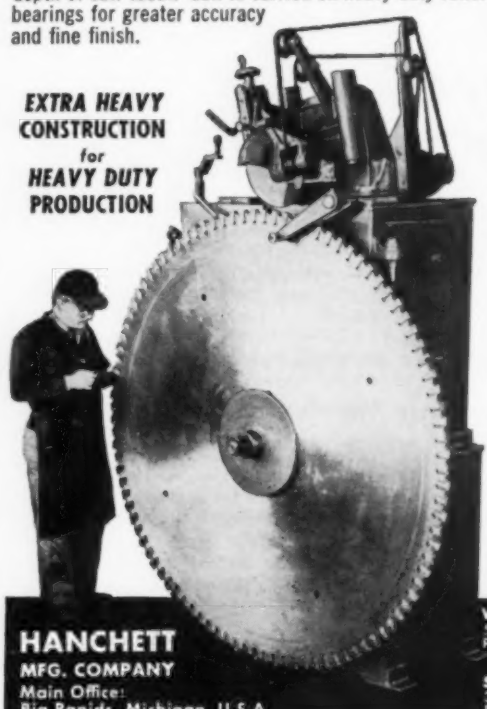

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Toward the New Frontier on Tired Backs?

Billions are being tossed into unemployment relief, billions for foreign aid, and further billions for farmers and other segments of the economy; then there's Health, Welfare and Education, and who knows what else will advance and be recognized in the scramble to the new frontier.

What about a new frontier for those who pay for all this?

Frankly, what about industry, on whose broad back the triumphant beneficiaries will be toted? Let's stop kidding ourselves and realize that America's productive equipment is tired and old; it will become increasingly difficult to meet the bills. Unrealistic governmental fiscal policies have militated against expansion and replacement of our productive equipment, where much of our wealth originates.

A weary and worn industry cannot meet the optimistic bills of the new frontier, cannot provide employment, cannot meet foreign competition, cannot reduce prices. From an inefficient industry we can expect only more unemployment, higher prices, and fewer tax dollars. To be sure, some palliatives have been suggested: a Buy American plan, labor's refusal to work with components made overseas, higher tariffs, industry going abroad and importing parts to be assembled here . . . what monumental nonsense this all is!

We must attack the root of the problem on a broad, three-fold front, composed of government, labor and industry.

If the government is a partner, taking 50% of the profits, is it too much to ask that the partner contribute to the health of the partnership by at least providing a favorable climate in which the partnership can operate? If the partner can subsidize farmers and others and can organize an FHA to stimulate housing, is it too much to suggest a revised depreciation law and a stimulating climate for reinvestment in equipment? Without asking for subsidies, cannot government set up an agency to underwrite modernization and replacement programs?

If labor thinks its featherbedding and continuing wage increases help industry and provide security for the membership, let it but look at the 6 million unemployed. Unless there's an end to featherbedding and an end to the more-pay-less-work philosophy, the bread lines will get longer each year. Labor must stop acting like a sophomore and join industry in solving their mutual problems.

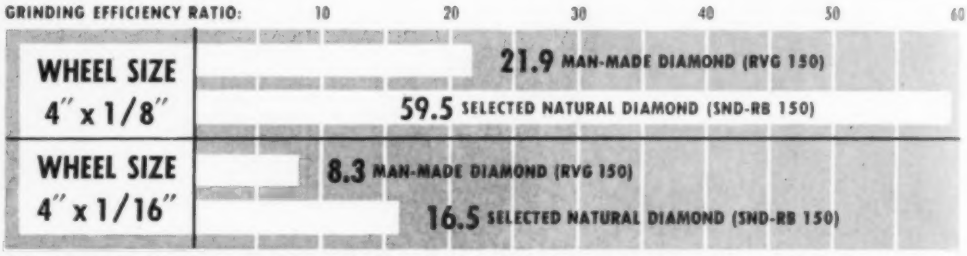
Industry is not blameless either. Its indirect costs have skyrocketed, there's featherbedding and dead wood at the management level. Employee relations have not always been noteworthy. Frequently, modernization and replacement programs have bogged down in a quagmire of indifference and apathy. More and more financial men are active in the running of a business; they don't know that products are not produced on an adding machine. You don't make money by saving it. Management must realize that, whether it likes it or not—and I'm sure you'll agree, none of us likes the thought—this is a battle of survival in domestic and world markets.

Too many fiscal experts in the government and some labor leaders have their heads in the dark sand, where the lights have already gone out.

Wm. F. Schleicher

Vice President & Editorial Director

Tests prove... SND (Selected Natural Diamond) doubles cup wheel life and output in carbide tool grinding



TEST CONDITIONS–Dry Grinding - **WHEELS:** Cup Type-D6A9 - **SPINDLE SPEED:** 3600 RPM. (3800 S.F.M.) - **DOWNFEED:** .0015" - **MATERIAL:** ⅜" x ¾"

One wheel with SND (Selected Natural Diamond) does the work of two wheels containing man-made diamond in carbide tool grinding!

The unequalled performance capabilities of SND –the most advanced development of diamond technology–are now proven indisputably in *realistic* tests with cup wheels, conducted under shop-use conditions that apply in your own tool grinding operations.

Performance results, charted here, provide positive proof that SND assures unmatched efficiency and economy in precision grinding procedures. As shown, SND outperforms man-made diamond with up to *98% greater grinding efficiency in 1/16" rim cup wheels* . . . with up to *172% greater efficiency in 1/8" rim cup wheels!*

To the diamond wheel user, this means that SND doubles or triples wheel life and output over man-made diamond cup wheels... insuring wheel cost savings of at least 50%!

Your diamond wheel supplier has the knowledge and experience to help you select SND (Selected Natural Diamond) in wheels best suited to your particular requirements.

To keep up to date on latest developments in industrial diamond technology–including indisputable test results that prove SND superiority–write for Engelhard Hanovia's technical bulletins.

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